July 5, 1943

STEEL

The Magazine of Metalworking and Metalproducing
IN TWO SECTIONS
ESTABLISHED 1892
SECTION ONE

TECHNOLOGY DEPT.
PUBLIC LIBRARY
1943

300 feet of "Lightning" that knows how to strike!

"D-E" Boat is what the Navy calls her! She's a Destroyer Escort—300 feet of "lightning" built to dish out what it takes to make Axis "wolf packs" wish they had stayed home.

Slim, sleek, and deadly, the D-E's are propelled by Diesel engines and manned by crews who know how to do the job assigned them.

Many of the Diesels for Destroyer Escorts and other U. S. Navy warships are of Fairbanks-Morse manufacture. The skill, facilities, and engineering experience that have given Fairbanks-Morse Diesels a world-wide reputation for dependability are now being used to provide dependable power for U. S. Navy craft — when dependability is so important. Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.

FAIRBANKS, MORSE & CO.

Announcing the New Ampac '200'

Today the big swing is to alternating current welding . . . and here it is at its newest and finest in Allis-Chalmers' new Ampac "200" Note how much more the new Ampac gives you in savings, faster work, better welds!

Compare 4 leading types of Transformer Welder in their Use of 11 Important Features . . .

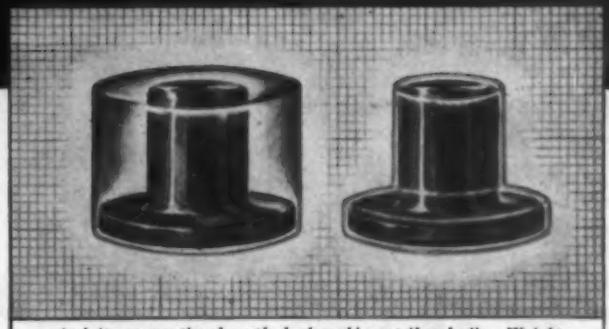
	IMPORTANT FEATURES	HOW THEY BENEFIT YOU	AMPAC "200" (Integrated moving core type)	WELDER "B" (Moving coil type)	WELDER "C" (Moving core type)	WELDER "D" (Shunt type, moving core)
1	No arc blow to slow down welding.	Steady arc makes sound, uniform welds. You can weld in corners and grooves easily. Production is speeded.	YES	YES	YES	YES
2	Low striking voltage at high amperage.	Saves power for you. No need for high voltage at high currents. Raises power factor — cuts power input.	YES (65 volts)	NO (75 volts)	NO (75 volts)	NO (75 volts)
3	High striking voltage at low amperage.	Strikes arc fast. Gives you high, yet safe voltage necessary. Makes a-c welding easy at low currents.	YES (78 volts)	NO (72 volts)	NO (75 volts)	NO (75 volts)
4	Takes less than 300 sq. in. floor space.	Small size saves valuable space on crowded shop floors . . . makes it easier for you to move and handle the unit.	YES (281 sq. in.)	NO (361 sq. in.)	NO (398 sq. in.)	YES (288 sq. in.)
5	Contains less than 5 wearing parts.	Cuts maintenance to simple lubrication twice a year. Less chance for wear means longer service, lower upkeep.	YES (4 parts)	NO (8 or more)	NO (8 or more)	NO (8 or more)
6	Low original cost (no rotating element).	Simpler construction of a-c welder cuts purchase price to around 65% of what you would pay for a d-c welder!	YES	YES	YES	YES
7	Wide welding range of over 200 amperes.	You can weld thin sheets . . . yet have capacity for heavy plates, too. You can use rods from 1/16" to 1/4" in size!	YES (220 amp)	YES (215 amp)	NO (195 amp)	NO (195 amp)
8	Reconnectable for 220-440 & 208 v., 60 cycle.	Gives you full capacity at low voltages where lines are long and isolated. Can be used on *any* standard a-c voltage!	YES	NO (220 or 440)	NO (220-440 only)	NO (220-440 only)
9	Over 85% efficiency at normal loads.	You enjoy *full* benefits of a-c welding: lower power loss, high power factor, lower operating costs!	YES	NO	YES	YES
10	All settings within six control turns.	Saves welding time. Welder can make simple adjustment from high to low amperage current quickly and easily.	YES (6 turns)	NO (50 turns)	NO (30 turns)	NO
11	Movement of variable part 2" or less.	Cuts wear and maintenance to a minimum. Reduces hum and vibration Contributes to trouble-free operation.	YES (1 inch)	NO (9 inches)	NO (6 inches)	YES
		Only Ampac gives you all 11 . . . TOTALS	**11** Ampac "200"	**3** Welder "B"	**3** Welder "C"	**5** Welder "D"

ALLIS-CHALMERS AMPAC "200"

WRITE ALLIS-CHALMERS, MILWAUKEE, WIS., FOR COMPLETE INFORMATION

A1639

SAVING TIME AND MATERIAL IN MAKING STRIKER BODIES...



At left: conventional method of making striker bodies. Weight of blank, 2.14 lbs. At right: Bethlehem's method. Weight of blank, 1.28 lbs. Shaded portions show amount of steel which had to be machined off in each case.

While establishing records and making savings of material in large-tonnage departments, Bethlehem is overlooking no chance to speed production and conserve materials in smaller-scale operations, where gains are measured in pounds rather than tons.

Take this striker body as an example. It is a key part of the time-fuse mechanism of a bomb, and was formerly made by machining a cold-rolled bar 2.30 in. in diameter down to finished dimensions. As is clear from the drawing at right, this meant long machining time, with the tie-up of hard-pressed automatic lathes, as well as waste of material.

When assigned to the job of producing these striker bodies, instead of making them in the conventional way Bethlehem engineers cast about for a faster, more economical method. The method finally used: A hot-rolled bar only slightly larger than the finished stem of the striker body was used, and the flange upset-forged to the desired diameter. Then, with only light machining, the job was complete.

This short-cut reduced a time-consuming machining operation. It eased the pressure on the automatic lathes, and on the mill's cold-rolling capacity. It speeded up production of striker bodies about 75 per cent. And it saved nearly 60 per cent of turnings, or 0.86 lbs. of material per piece. With striker bodies being turned out by the thousands, the saving in material alone is therefore a substantial item.

BETHLEHEM STEEL

When the dam breaks

AWAITING the release of materials, machinery and man power now used in war production, is a backlog of consumer demand exceeding anything in our history. And, stored up in savings and War Bonds, are billions of dollars to pay for these goods.

This pent-up demand is a challenge to American industry. It offers us the opportunity to keep our plants running, to provide reasonably full employment, to build up peacetime sales and continued prosperity.

But, postwar buyers will not be satisfied with mediocre goods at fancy prices. They'll want sound values at reasonable cost. To give them such values, and to maintain our standards of living and wages, will require the most modern and efficient machinery.

Present equipment won't do it, in many plants. We've driven our new machines so hard in war production that we've taken years from their lives. Old equipment, continued in service because replacements were scarce, will be outmoded. Only new and modern tools, of highest efficiency, can turn out the goods the people want, at reasonable prices. Only that way can we meet this challenge.

And as we do so, earnings will accrue that will permit the cycle to be started again. New machines, new methods and new products will continue to lead to more demand, more employment, more sales and earnings.

Thus our American standards will be maintained, with peace, contentment and employment for all.

THE MONARCH MACHINE TOOL COMPANY • • • SIDNEY • OHIO

MONARCH LATHES
Save Time

WILL YOU BE READY?

BEHIND THE SCENES

Letter from a Draft Board

■ We came across this letter from a draft board in Wellsburg, West Virginia in *Iron Men of Hendy*, an interesting little monthly published by the Joshua Hendy Iron Works out in Sunnyvale, Calif. We think it packs quite a wallop.

"You are classified in Class II-B as a 'necessary' man in a critical occupation in an industry essential to the War Effort. Someone went to the Army in your place.

"We have no obligation to lecture you as to your responsibilities in this time of crisis. But we feel compelled to point out something you may not fully realize.

"You have been excused from military service for the present. So far as we know you would make a good soldier. There are about 2000 men, many of them your friends, from this small county in the armed forces. All are sworn to obey a superior officer and to defend with their lives the small part of the fighting front entrusted to them. Many of them are homesick and without much money. In a real way they are making our lives more secure.

"You have the obligation to prove to the community that this Local Board was right in its judgment that your work is more important for the good of all men than military service would be. That was the judgment of men, who, like you, are trying to serve their country. You can show that they were right or you can show they made a mistake.

"We know of at least five boys who have gone through this office who will never return. That we had a part in sending them is a serious thought. That someone went in your place and perhaps will not return should be a serious thought for you.

"Those of us who cannot do as the 2000 have done, can make them and their future more secure by doing our best work in our humdrum jobs at a typewriter or a Diesel engine. Maybe we can make our jobs as important as the soldier's in Algiers. We certainly must try!

"These thoughts help us get up in the mornings when we don't want to and help us keep going when we are tired. Let's try to get others to feel and work that way, too!"

New Products Mean New Markets

■ You'll be interested, we believe, in just a few of the highpoints dug up by one of our editors on a trip last week through the east. Right now we can't name names but you'll get the details in future issues

Fifteen calls dug up these new products, either already developed or definite possibilities for the postwar market: A new speed jack; new continuous rod annealing process; a new ingot insulating material which cuts down on hot-top losses; new light metal drawing equipment; new triplexing method for producing steel; new 0.003-inch precision drill for Diesel engine jets; new variable speed drive; railroad car axles upset from steel tubing; new pressed metal windows; new special purpose machines of several types and a half-dozen other items still under the cloak of secrecy.

Out of the fifteen calls, eight of the companies had active postwar planning committees, usually incorporating all the important production department heads and the advertising and sales promotion manager. In the other seven plants, the top executives were beginning to do some thinking but as yet had not set up a definite committee or felt it unnecessary because of the size of the company.

Among the machine tool builders particularly, postwar plans are awaiting renegotiation of government contracts but despite this two of three eastern builders contacted last week were definitely optimistic on their postwar markets in view of new applications and closer tolerances which they foresee.

There is going to be a tremendous amount of new technical information come out of wartime developments. To you who want more and better information to use as a basis for planning . . . watch STEEL.

Elusive NE Steel Selector

■ J. L. Bouton of Manning, Maxwell & Moore, after getting a set of our NE Steel Selector and NE Steel Handbook, writes:

It certainly has already proven of great help in our office and my only trouble is in keeping it. Guess I will have to chain it fast to my desk.

Planning Now

■ This week in STEEL you will find a two-page insert headed—"Why PLANNING can not be left until the end of the war"—a statement by E. L. Shaner which very clearly and simply gets at the essence of postwar planning and explains just why and what STEEL is doing about it. You will find it on page 111.

More Garden Advice

■ Since running the garden column here recently we have been deluged (1) with requests for all kinds of information on how to grow 'em better and bigger. But the question that ran through every letter was how to distinguish weeds from vegetables. The answer is simple. Just cut them all down and then the ones that come up again are the weeds.

Tardy Soldier

■ It's been some time since we tossed out one of those mental twisters because we have been fully aware of the eraser shortage on lead pencils, but this one got us down so, we can't resist passing it on.

A soldier, bolting out of camp to go to town, noticed the position of the hands of the clock, since he had only a two-hour pass.

He returned tardily between two and three hours later and saw to his amazement that the clock hands had exchanged places. How much did he overstay his leave? The correct answer is worth an NE Handbook and Selector.

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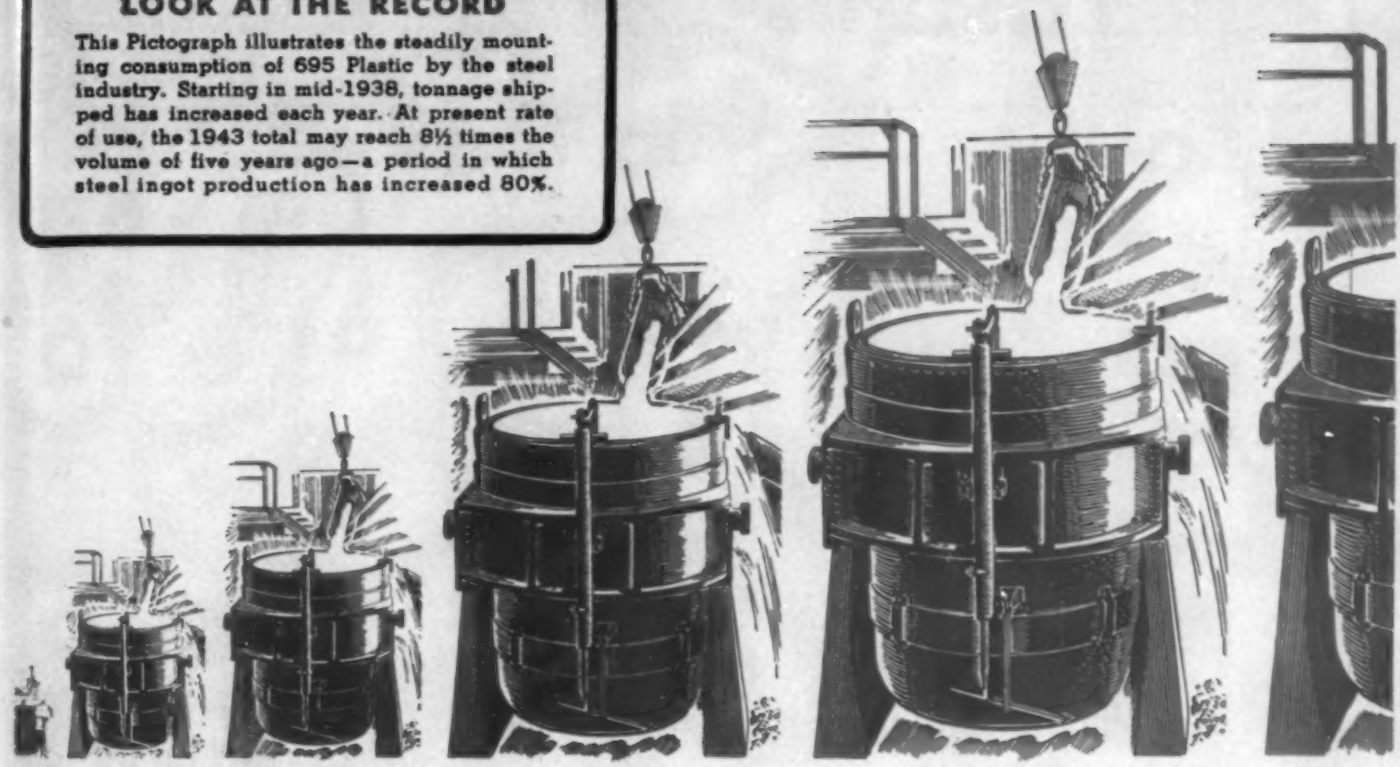
Editorial Contents—Page 53

LOOK AT THE RECORD

This Pictograph illustrates the steadily mounting consumption of 695 Plastic by the steel industry. Starting in mid-1938, tonnage shipped has increased each year. At present rate of use, the 1943 total may reach 8½ times the volume of five years ago—a period in which steel ingot production has increased 80%.



1938 (PART) 1939 1940 1941 1942 1943 (3 MO.)

695 -the ACCEPTED plastic refractory

Since its introduction to the steel industry in 1939, the use of 695 Plastic has doubled, redoubled, and then doubled again. The reasons for this ever-growing acceptance are self-evident.

695 is a convenient, ready-to-use refractory. It is most popular as a tap-hole mixture, because it so greatly lengthens tap-hole life. Many open hearth men find that a 695 tap hole lasts double the number of heats obtained with ordinary chrome ore or homemade mixes.

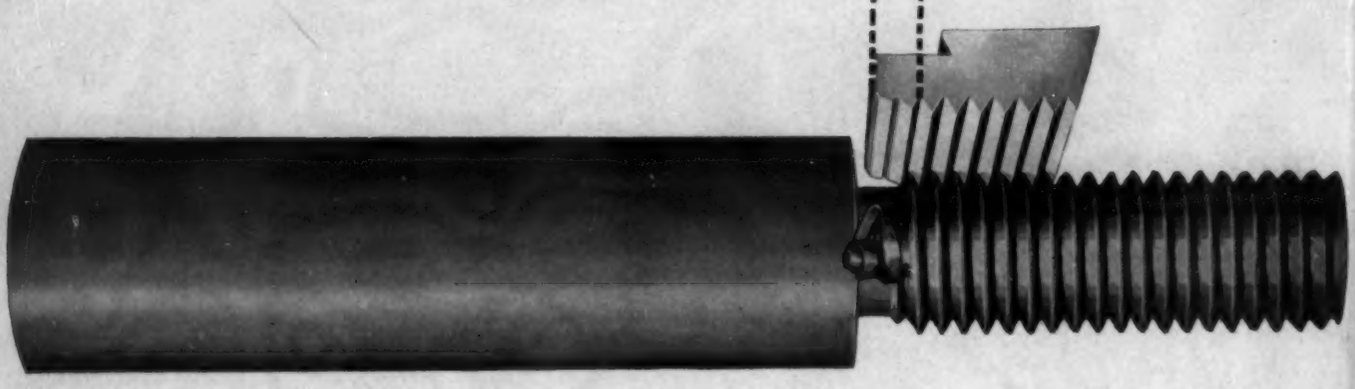
695 is just as suitable for dozens of other hot applications in both open hearth and electric furnaces. It is easy to apply, sets quickly and stays in place. It has a melting point well above 3600°F.

No wonder 695 is in regular use in more than 70 steel plants. If you are not yet using it, you may be missing a chance to reduce tap-hole and other delays. Get in a few bags of this dependable, plastic, high-magnesia refractory and try it.

BASIC REFRACTORIES, INCORPORATED
CLEVELAND, OHIO

LANDIS CHASERS PERMIT "CLOSE-TO-SHOULDER" THREADING THROUGHOUT ENTIRE LIFE

The Length of Chaser Throat remains permanent



When regrinding the chasers, the entire cutting edge is renewed without increasing the length of the "bevel" or throat. The throat of Landis chasers is never reground. Thus, "close-to-shoulder" threading is permitted throughout the entire life of the chasers.

The cutting edge is always directly on cutting center regardless of the overall length of each individual chaser. The cutting position is not affected by regrinding.

The Finest Thread Cutting Tool in Industry

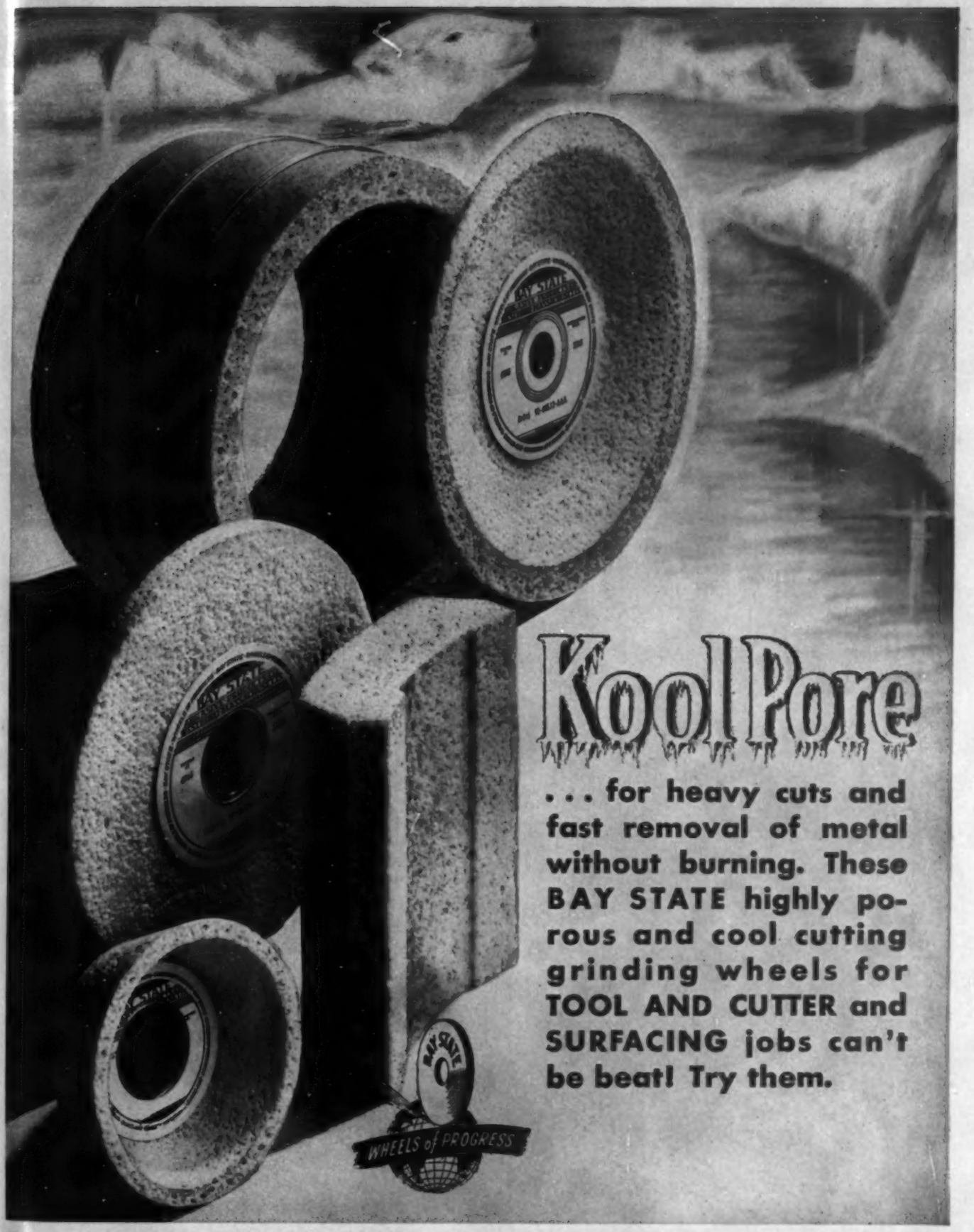
12 Features of the LANDIS TANGENTIAL CHASER

1–Permanent throat permits close to shoulder threading throughout life of chasers
2–Rake angle range covers all machinable materials
3–Free cutting condition permits maximum cutting speeds
4–Simple grinding operation renews entire cutting edge and leading feature
5–Line contact with work lessens friction and minimizes thread distortion
6–Leading feature insures thread of accurate lead
7–Lateral absorption of cutting strain reduces vibration and chaser breakage
8–Right and lefthand threading feature reduces chaser equipment
9–Standard chasers thread all diameters with proper chaser holders
10–Interchangeability of chasers lowers operating cost
11–Chaser length provides exceptionally long life and low tool cost
12–Permanent throat gives equal distribution of cut

LANDIS MACHINE COMPANY

WAYNESBORO, PA., U.S.A.

THREADING MACHINERY—THREAD CUTTING DIE HEADS—COLLAPSIBLE TAPS

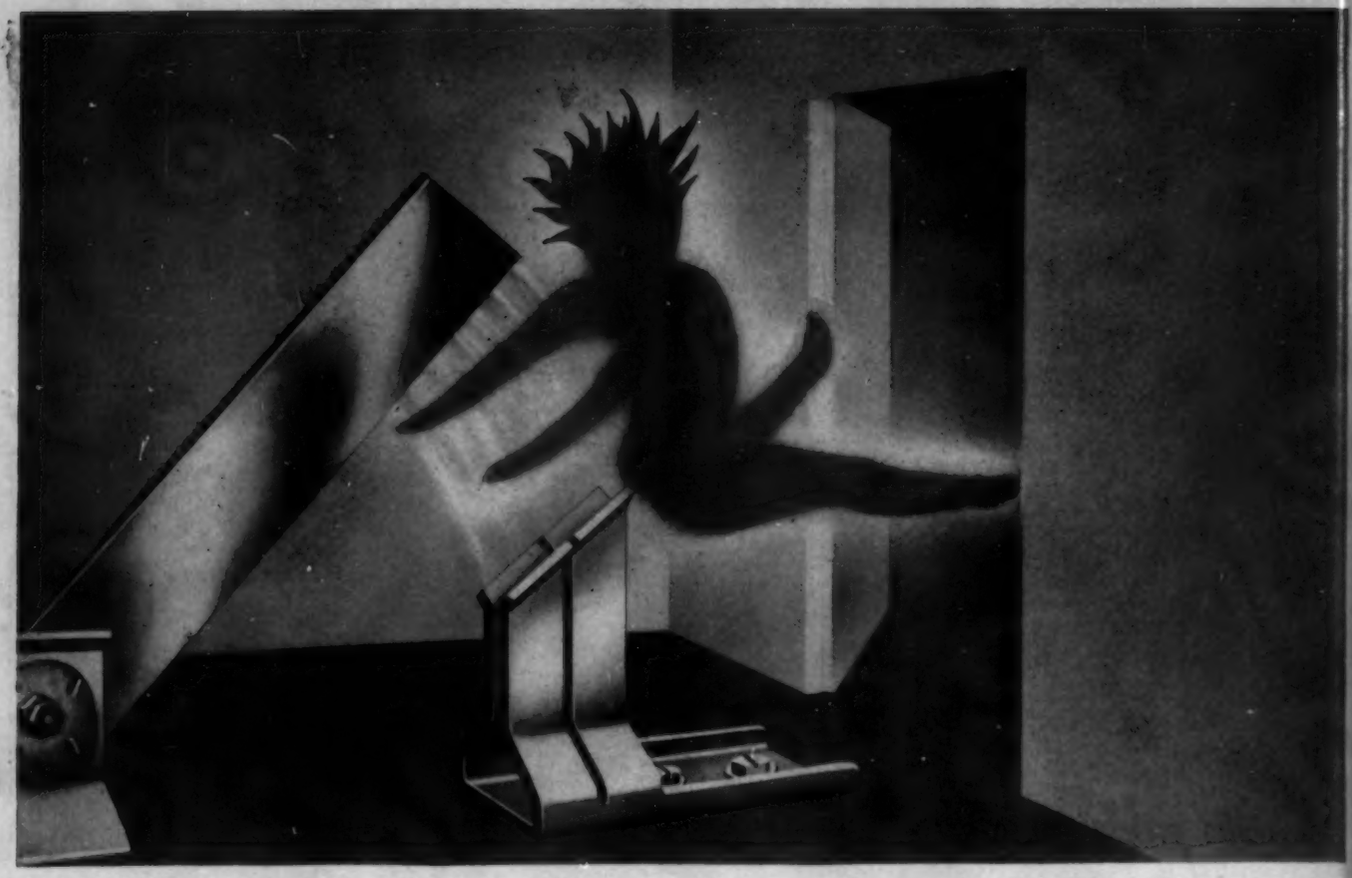


Kool Pore

. . . for heavy cuts and fast removal of metal without burning. These BAY STATE highly porous and cool cutting grinding wheels for TOOL AND CUTTER and SURFACING jobs can't be beat! Try them.

BAY STATE

ABRASIVE PRODUCTS CO., WESTBORO, MASS. U.S.A.



at this point—arcs go **Out!**

LIKE THIS

Diamond-pointed break jaws confine arcing to the point . . . force the arc to break outside the current-carrying areas. Contact surfaces stay clean, don't pit and burn.

NOT LIKE THIS

When ordinary safety switches are opened the arc leaps across the contact areas . . . along the jaw and blade. It hangs on longer, burns and pits the contact surfaces.

PLANTS IN 25 CITIES . . . WESTINGHOUSE OFFICES EVERYWHERE

When a switch is opened under load, hot arcs leap between the opening contacts. Burning with terrific heat, they bead and pit the contact areas—unless they are controlled and extinguished *quick*.

Westinghouse Safety Switches do both these jobs. With break jaws pointed like a diamond and the blade extended, leaping arcs are forced to break *outside* the current-carrying area. Contacts stay clean, last longer.

Installed in your plant, Westinghouse Safety Switches will reduce time-outs for maintenance and inspection, provide better, more dependable protection. For circuits of 575 or 600 volts, you get another protective plus—the "De-ion" arc quencher. This exclusive feature divides arcs, extinguishes them quickly.

Provide your important circuits with the protection they need—install Westinghouse Safety Switches. Available in ratings up to 1200 amps, 600 volts. Call your nearest Westinghouse office or write Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa., Dept. 7-N.

J-21275

Westinghouse SAFETY SWITCHES

The new K type Navy blimp is able to fly at 80 miles per how or to hover motionless over a lurking submarine. These airships have proved an efficient answer in protecting coastwise shipping against the undersea menace.

★★★ *Guardian Angel* OF THE CONVOY

Swinging majestically over the convoy, the blimps are proving an effective answer to the submarine menace. Sinkings have been practically eliminated in convoys so guarded.

Able to scan the ocean for miles, able to see below the waves, able to hover over the slowest tanker, or to fly at many times the speed of the fastest wolf pack, these guardian angels of the fleet owe much of their effectiveness to the engines that power them.

And in these Pratt and Whitney engines, as in every part of the ship, weight is a vital factor. To produce gears of the necessary lightness—of the extreme precision that this lightness, coupled with tremendous horsepower, demands—meant a new conception in gear manufacture. Today, these gears are being produced at Foote Bros. in amazing quantities.

The new manufacturing techniques, new production know-hows that make these lightweight, high-precision gears possible, will mean better performance and greater operating efficiency when they are applied to peacetime machines.

FOOTE BROS. GEAR AND MACHINE CORPORATION • 5225 S. Western Boulevard, Chicago, Illinois

FOOTE BROS.

Better Power Transmission Through Better Gears

Cast Your Own Special Refractory Shapes

WITH LACLEDE HEARTHMIX OR SUPER CASTABLE • • • the *Original* Mix and Pour Castable Refractories

Why wait for special refractory shapes when you can keep production rolling by casting them on the job with Laclede Hearthmix (2700° F.) or Laclede Super Castable (2900° F.)? Why spend extra time and money cutting all kinds of special shapes to fit doors, burner rings, baffles, burner blocks, ports, special skews, etc., when you can make them quickly and easily — right on the job — and often have them ready within 24 hours?

Hearthmix and Super Castable are the original mix and pour castable refractories which set at normal room temperature. They are non-shrinking and are not affected by steam or moisture. They will not crack or crumble under alternate heating and cooling periods and do not deteriorate during intervals of non-use.

When you need an insulating refractory castable, use Laclede Pore-Lite, a light weight insulating castable that withstands temperatures up to 2500° F. in direct contact with flame. Approximately 4½″ of Pore-Lite is equivalent to 15″ of first quality fire brick or 7½″ of heavy weight castable.

It isn't necessary to take a chance on holding up production. Keep these castables on hand all the time for those unexpected jobs. Your local dealer or agent will be glad to furnish them. ***Get his name from your local telephone directory, or write direct.***

LACLEDE ENGINEERING SERVICE

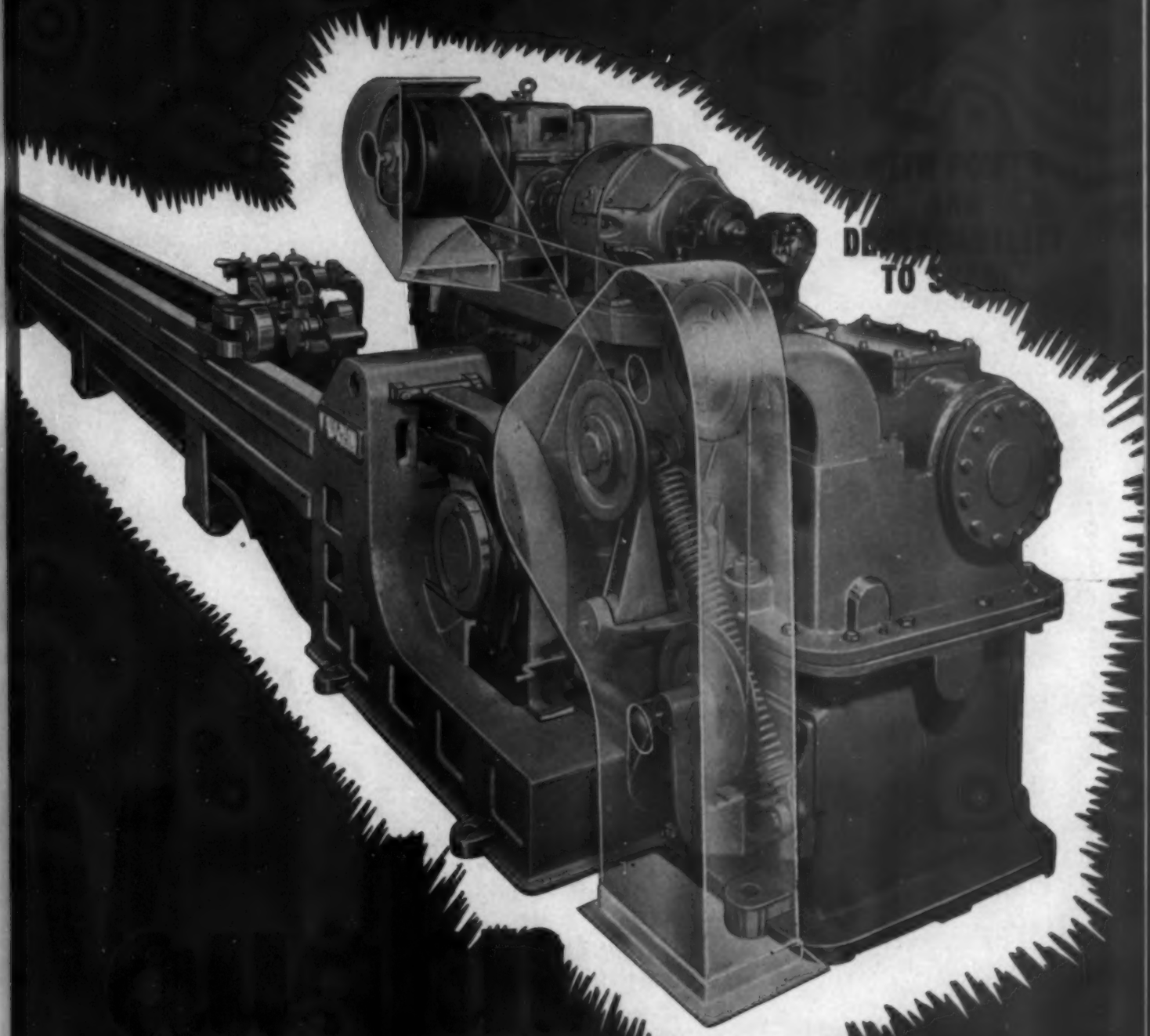
When you have a problem involving refractories, call in a Laclede-Christy engineer. Because Laclede-Christy offers a *complete* line of refractories, he will give you an unbiased recommendation — the *right* recommendation for your job. Complete blueprints and estimates will be furnished without cost or obligation.

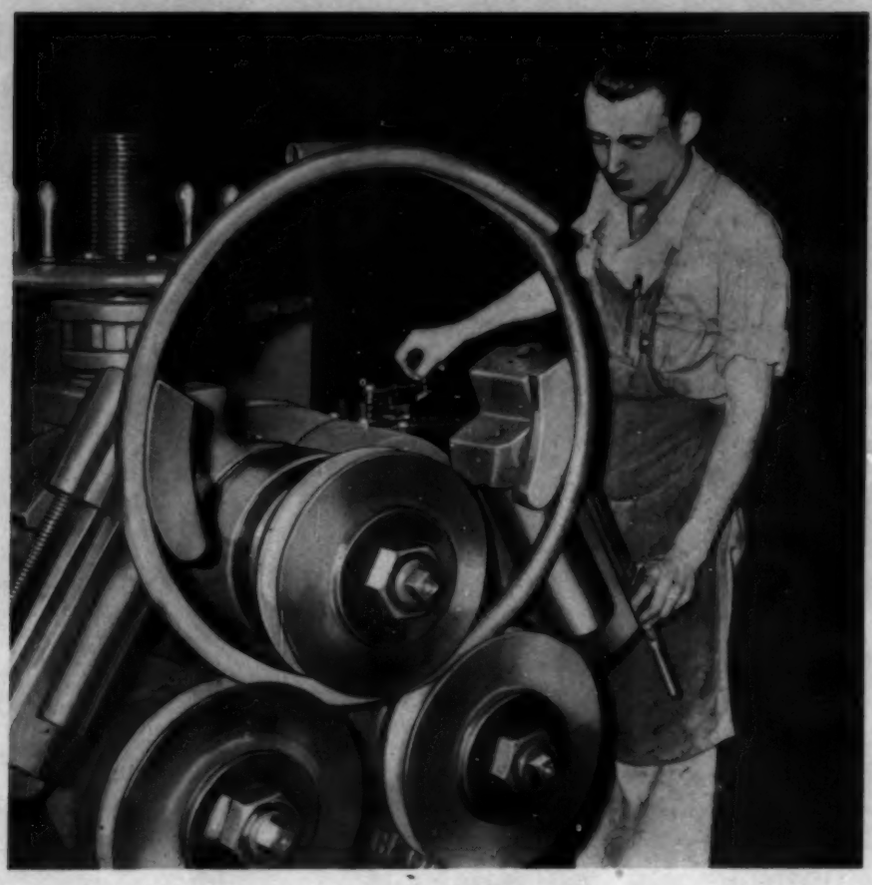
LACLEDE-CHRISTY FOUNDED 1844 ST. LOUIS, U.S.A.

LACLEDE-CHRISTY
CLAY PRODUCTS COMPANY

Ambassador Bldg., St. Louis, Missouri

World's Largest and Most Diversified Line of High Temperature Refractory Specialties





Save Critical Time on every Bending Job

CIRCLES..SEGMENTS..SPIRAL FORMS

★ In a fraction of the time required by ordinary methods, one man and a Buffalo Bending Roll can turn out a wide variety of accurate, uniform circular forms to meet urgent production demands. Buffalo Bending Rolls are easy to operate, even for unskilled labor—and their husky construction insures continuous, trouble-free performance . . . Minutes are precious—"Buffalo" can point the way to conserve them on bending operations. Write for Bulletin 352-A, containing full engineering data.

BUFFALO FORGE COMPANY
158 Mortimer St. Buffalo, N. Y.
CANADIAN BLOWER & FORGE CO., LTD., KITCHENER, ONT.

ARMY E NAVY

"Buffalo" BENDING ROLLS

N-A-X High Tensile

It was no mere chance that manufacturers of Army Ordnance materiel selected N-A-X HIGH TENSILE for parts for gun mounts, Jeeps and Tanks and other pieces of equipment. Long before the war N-A-X HIGH TENSILE had won unqualified approval of both fabricator and user, because this high strength steel was easy to form, draw and weld. N-A-X HIGH TENSILE, the really superior low alloy steel, does not air harden. It fuses and mixes with the weld metal readily, easily . . . and can be readily welded by any of the commercial processes.

N-A-X HIGH TENSILE also has great resistance to impact and fatigue in both extremely hot or sub-zero temperatures. It has unusually high ductility, high yield point, high ultimate strength and marked resistance to corrosion and abrasion—properties that make for speedier fabrication and longer life.

Full information is available on N-A-X HIGH TENSILE. Write today for your copy of a new booklet describing the properties and characteristics of N-A-X HIGH TENSILE . . . the truly versatile low alloy steel.

GREAT LAKES STEEL CORPORATION
Detroit, Michigan
Sales Offices in Principal Cities

NATIONAL STEEL

Division of
NATIONAL STEEL CORPORATION
Executive Offices · Pittsburgh, Pa.

Tomorrow's Press-- TODAY!

The Press illustrated has two connections one at each side of slide. Other Presses of this type are Single Point—one connection, and Four Point—four connections.

Modern Cleveland Presses, which are now being used extensively in the war effort, incorporate many features applicable to "after war" production.

In these Presses, the gears, flywheel and drive unit are located in the box type crown, thus eliminating all overhanging gears and other projections, and conserving valuable floor space.

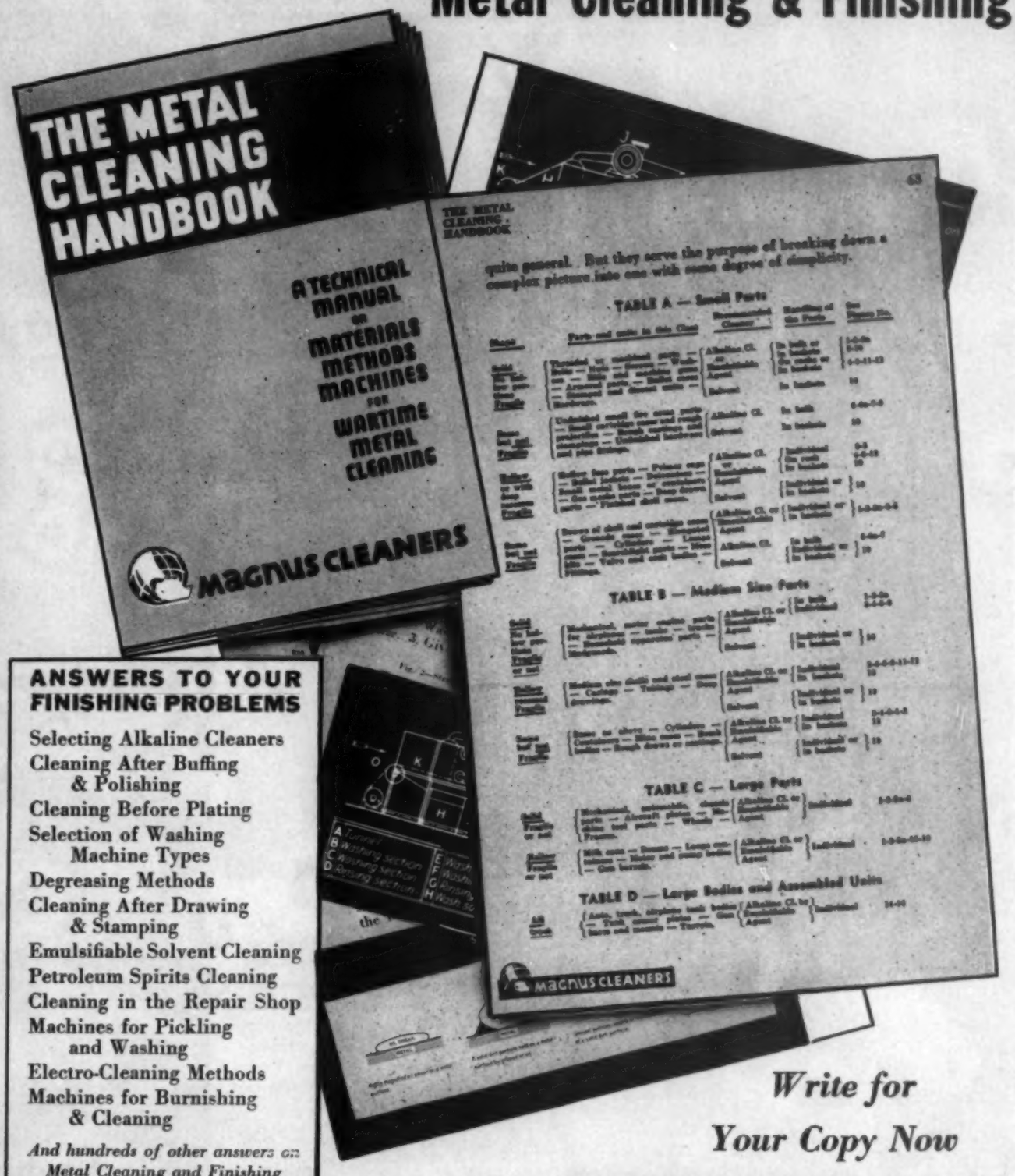
The pneumatically or hydraulically operated friction clutch is electrically controlled by one or more stations and the counterbalance for the slide is located in the upright.

This type of Press can be furnished in Single Point having one connection, Two Point having two connections or Four Point having four connections, in sizes and capacities to suit particular requirements.

THE CLEVELAND PUNCH & SHEAR WKS CO. U.S.A.

THE CLEVELAND PUNCH & SHEAR WORKS CO CLEVELAND · OHIO

The Only COMPLETE Manual on Metal Cleaning & Finishing


THE METAL CLEANING HANDBOOK
A TECHNICAL MANUAL on MATERIALS METHODS MACHINES for WARTIME METAL CLEANING
Magnus CLEANERS
THE METAL CLEANING HANDBOOK
quite general. But they serve the purpose of breaking down a complex picture into one with some degree of simplicity.
TABLE A — Small Parts
TABLE B — Medium Size Parts
TABLE C — Large Parts
TABLE D — Large Bodies and Assembled Units
Magnus CLEANERS

ANSWERS TO YOUR FINISHING PROBLEMS

- Selecting Alkaline Cleaners
- Cleaning After Buffing & Polishing
- Cleaning Before Plating
- Selection of Washing Machine Types
- Degreasing Methods
- Cleaning After Drawing & Stamping
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- Cleaning in the Repair Shop
- Machines for Pickling and Washing
- Electro-Cleaning Methods
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And hundreds of other answers on Metal Cleaning and Finishing Operations

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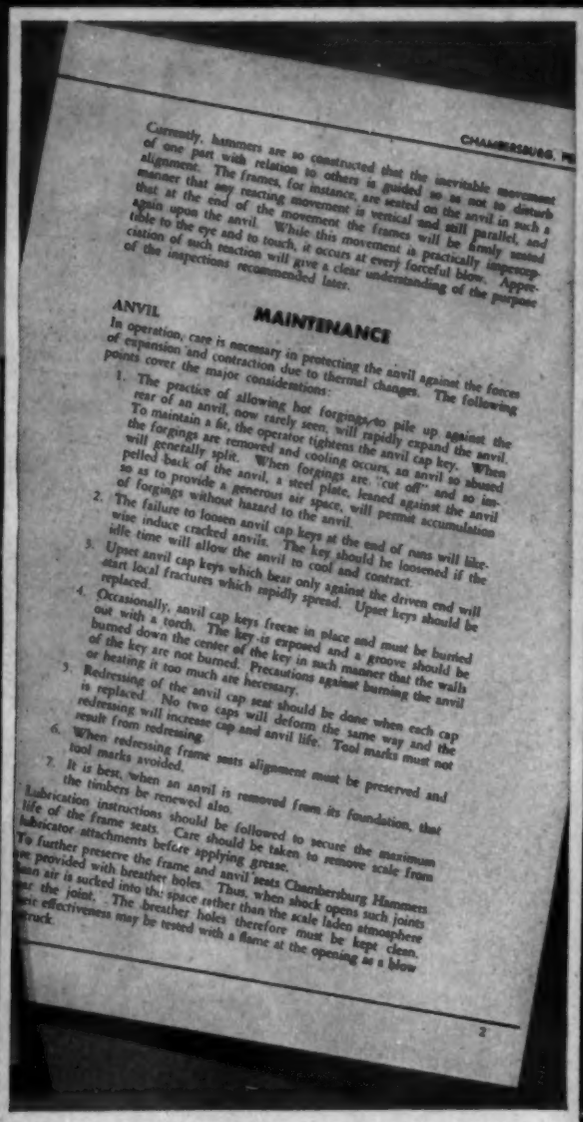
MAGNUS CHEMICAL CO.

206 SOUTH AVENUE GARWOOD, N. J.

Magnus CLEANERS-METHODS-MACHINES

A FORGING HAMMER TENDS TO DESTROY ITSELF
• • • MAINTENANCE IS IMPORTANT • • •



CHAMBERSBURG

Currently, hammers are so constructed that the inevitable movement of one part with relation to others is guided so as not to disturb alignment. The frames, for instance, are seated on the anvil in such a manner that any reacting movement is vertical and still parallel, and that at the end of the movement the frames will be firmly seated again upon the anvil. While this movement is practically imperceptible to the eye and to touch, it occurs at every forceful blow. Appreciation of such reaction will give a clear understanding of the purpose of the inspections recommended later.

MAINTENANCE

ANVIL

In operation, care is necessary in protecting the anvil against the forces of expansion and contraction due to thermal changes. The following points cover the major considerations:

1. The practice of allowing hot forgings to pile up against the rear of an anvil, now rarely seen, will rapidly expand the anvil. To maintain a fit, the operator tightens the anvil cap key. When the forgings are removed and cooling occurs, an anvil so abused will genetally split. When forgings are "cut off" and so impelled back of the anvil, a steel plate, leaned against the anvil so as to provide a generous air space, will permit accumulation of forgings without hazard to the anvil.
2. The failure to loosen anvil cap keys at the end of runs will likewise induce cracked anvils. The key should be loosened if the idle time will allow the anvil to cool and contract.
3. Upset anvil cap keys which bear only against the driven end will start local fractures which rapidly spread. Upset keys should be replaced.
4. Occasionally, anvil cap keys freeze in place and must be burned out with a torch. The key is exposed and a groove should be burned down the center of the key in such manner that the walls of the key are not burned. Precautions against burning the anvil or heating it too much are necessary.
5. Redressing of the anvil cap seat should be done when each cap is replaced. No two caps will deform the same way and the redressing will increase cap and anvil life. Tool marks must not result from redressing.
6. When redressing frame seats alignment must be preserved and tool marks avoided.
7. It is best, when an anvil is removed from its foundation, that the timbers be renewed also.

Lubrication instructions should be followed to secure the maximum life of the frame seats. Care should be taken to remove scale from lubricator attachments before applying grease.

To further preserve the frame and anvil seats Chambersburg Hammers are provided with breather holes. Thus, when shock opens such joints clean air is sucked into the space rather than the scale laden atmosphere near the joint. The breather holes therefore must be kept clean. Their effectiveness may be tested with a flame at the opening as a blow is struck.

2

Whether you operate one or a dozen hammers . . . whether they are 2500 lbs. or 25,000 lbs. falling weight . . . proper maintenance will do much to lengthen their productive life . . . and to insure accurate, close-to-finish forgings. There are some valuable suggestions applicable to any make of hammer in Chambersburg's Model "E" Steam Drop Hammer Maintenance Book. A copy will be mailed on request.

CHAMBERSBURG ENGINEERING CO.
CHAMBERSBURG . . . . PENNA.

ARMY E NAVY

CHAMBERSBURG
HAMMERS · CECOSTAMPS · PRESSES

It's a cinch, our adman said, to write this is a "pipe,"
I needn't make a layout or set a lot of type.

The only thing I have to do is build a factual rhyme,
That tells how hard we're working to get you steel on time!

When you need an angle quick, or a beam or bar,
We can get it to you, no matter where you are.

At any time of day . . . or even if it's night,
You can rely on Levinson to do the job just right.

LEVINSON STEEL SALES CO.
33 PRIDE STREET · PITTSBURGH, PENNA.
Warehouse and Specialty Steels

4

NO, we don't recommend Joe MaGee's toe-hold welding grip—it's not very practical—but he sure is right in what he says! These nine G-E electrodes make it possible to use alternating-current for ***95 per cent of all arc welding jobs.*** That means easier welding, more uniform deposition, and up to 36 per cent ***faster*** welding than is possible with direct-current.

Each electrode in this line gives excellent results with a-c, and each is backed by an impressive service record. The W-26 is particularly outstanding. Developed especially for first-class a-c welding in the vertical and overhead positions, this electrode complies with all the following specifications: A.W.S. Filler Metal Specification E-6011; Navy Bureau of Ships, Specification 46E3, Grade 111, Class 1; American Bureau of Shi ping, Specification H1G and B1G; A.S.M.E. Boil Code, Paragraph U68.

Thousands of users have found that these electrod and G-E alternating current welders are the perfe combination for the fast welding speeds and hig quality welds needed to meet wartime productio schedules. If you are not already using a-c welding i will pay you to investigate its many advantages. Simpl contact your G-E arc welding distributor, or write t General Electric, Schenectady, N. Y.

Copyrighted, 1943, General Electric Co.

"Shucks! with all these good A-C ELECTRODES every welding job is easy!"

95 PER CENT of all Arc Welding Work Can Be Done Most Effectively with G-E A-C WELDERS and These NINE Heavily Coated G-E ELECTRODES

APPLICATION	G-E ELECTRODE	FILLER METAL CLASS (A.W.S.)
Mild steel in any position	W-26	E-6011
	W-20 W-30	E-6012
	W-25	E-6013
Mild steel in the flat position, and horizontal fillets	W-24	E-6020
	W-23	E-6030
High-tensile steel in the flat position, and horizontal fillets	W-54	E-7020
Cast-iron repair	W-83	.....
Wear-resisting surfaces	W-93	.....

ARC WELDING

GENERAL ELECTRIC

672-57-8148

BEST SPRING TRICK OF THE WAR

. . . CRAMMING A FIELD GUN INTO A TANK TURRET

THE tough problem here was to reduce gun recoil from feet to a matter of inches. But it was accomplished. Today, specially designed springs of special alloy steel that function perfectly in sharply reduced space, safely absorb the recoil wallop of the hard-hitting tank guns that jolt the Axis everywhere.

From these massive tank-gun springs to the tiny springs that arm explosive shells with a deadly precision that assures a burst at the touch of a silk parachute, our spring specialists have solved one problem of spring design after another. The same high standards of spring engineering are behind the reliable performance of every type of American fighting equipment for which we have designed and produced springs by the millions.

If you use springs, we can help you. Our spring engineers bring to your problems more than an expert knowledge of springs. Their intimate understanding of the wartime steels now available can be especially helpful in meeting the involved and difficult requirements that today face the spring designer.

U·S·S American Quality Springs

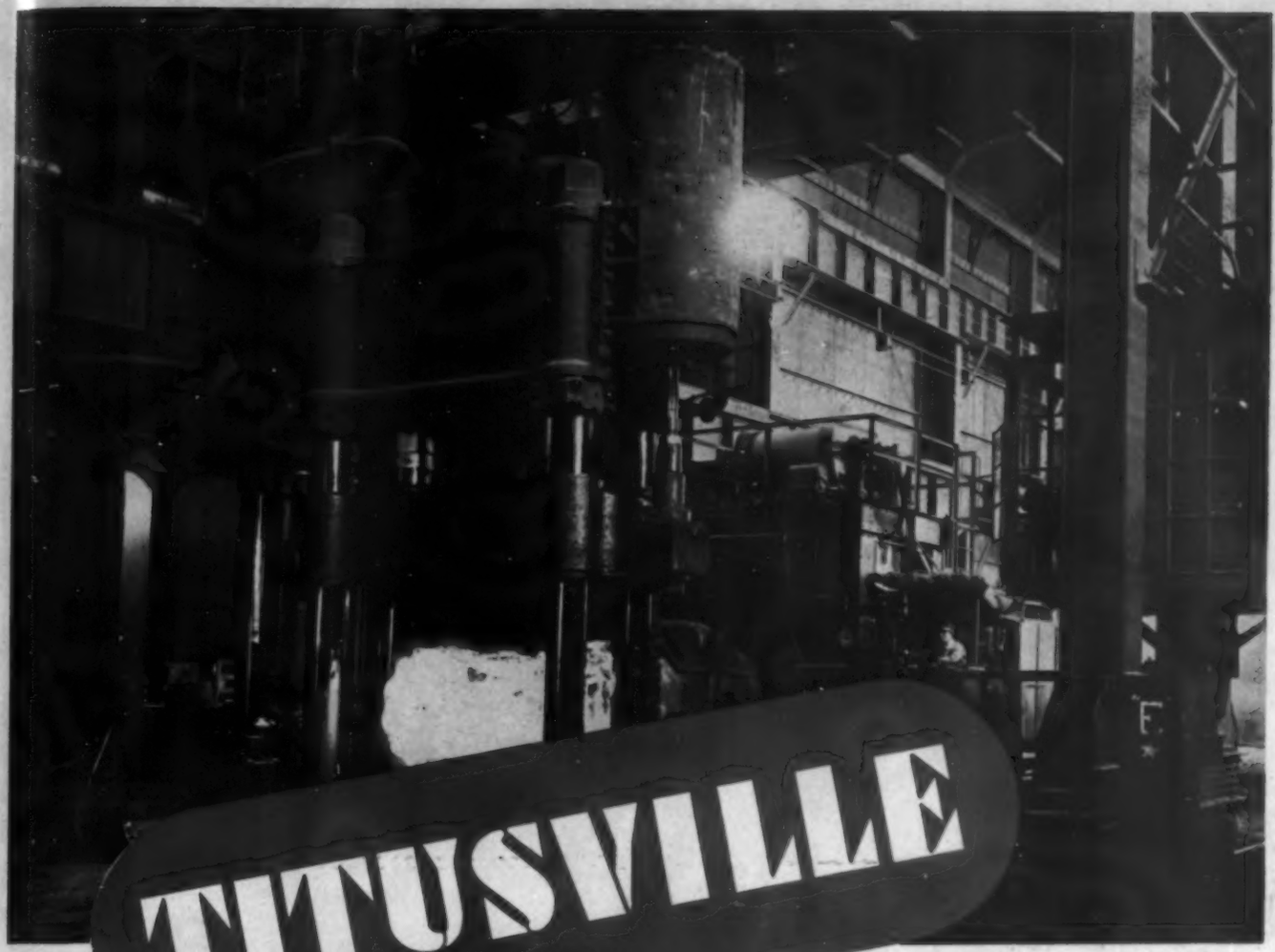
AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
United States Steel Export Company, New York

USS

UNITED STATES STEEL



TITUSVILLE

An outstanding name for many years in -

For outstanding production, the Army-Navy "E" Flag proudly flies over all of three plants.

FORGINGS

Heavy steel and Alloy Forgings, rough turned or finished machined complete.

SHAFTING

Line Shafts, Propeller Shafts and Thrust Shafts to all industrial and marine codes.

CRANKSHAFTS

Forged Steel Diesel Crankshafts to all codes and specifications on standard and special work.

STRUTHERS WELLS CORPORATION *TITUSVILLE FORGE DIVISION*
TITUSVILLE, PENNSYLVANIA

A Letter from Guadalcanal...

In a recent letter from a lad at Guadalcanal to his former employer was voiced the greatest challenge of our time.

"What," he said, "am I, and all these fellows with me, going to do when this thing is over?" Is peace to bring with it the deadly spiral: men laid off and demobilized, hence less purchasing power, hence more plants closed down, hence more men laid off, hence — ?

We believe we've seen the answer right on the production lines and right in the post-war plans of American industry.

We've seen and consulted with hundreds of research men uncovering new secrets in metallurgy, synthetics, plastics, aeronautics — finding new techniques and economies — planning new and wonderful products that will cushion the post-war interim to the greatest production age in history.

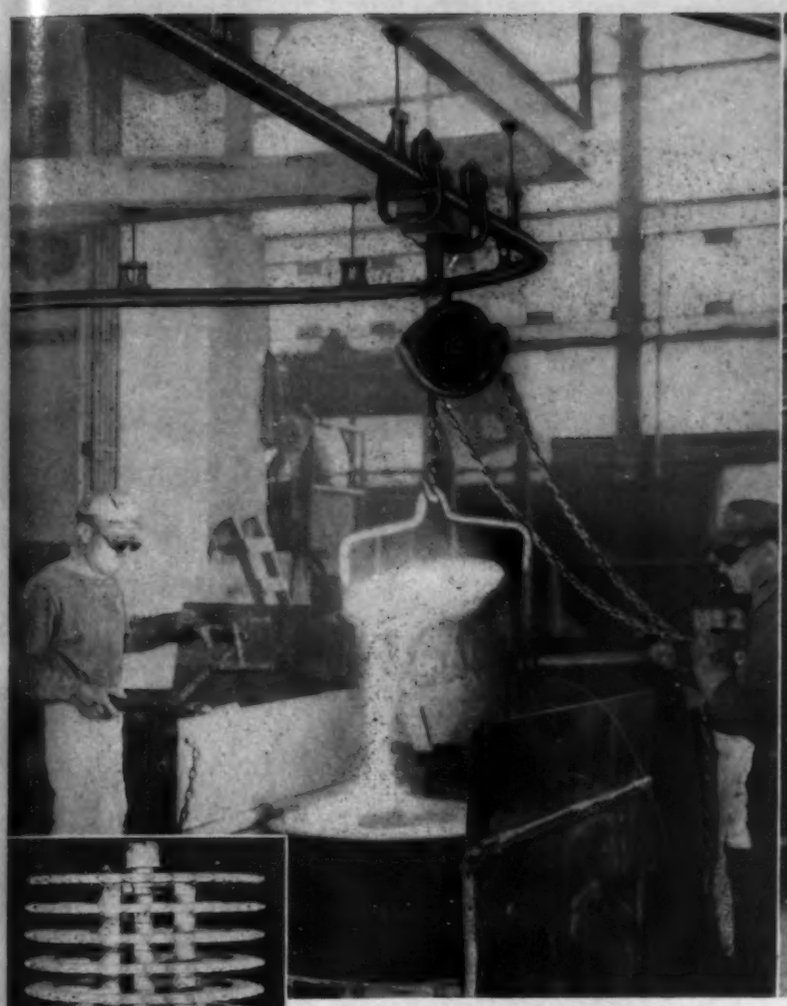
As internal grinding specialists, we at Bryant have already helped to solve production problems involving the machining of many new light metals, alloys, and synthetic materials including glass, plastics, hard rubber, wood, graphite, and even machine parts made of paper.

We've developed many new techniques in tooling, and we believe that this knowledge is important to your future. For that reason, our Consulting Service is available at all times. Call upon us now!

SEND FOR THE MAN FROM BRYANT...

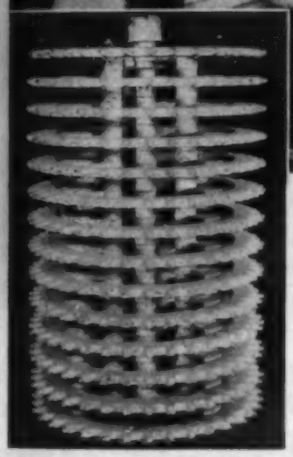
Bryant Chucking Grinder Company

Springfield, Vermont, U. S. A.



Metal is transported directly from the furnaces and poured into the spinning molds with the Cleveland Tramrail overhead system without rehandling.

Immediately after the molds are poured they are picked up with the electric hoist and taken to the shake-out.



$1,720,000 SAVED
(Annually in Labor and Materials)

8,860,000 pounds materials and 725,000 man-hours are estimated saved annually by casting these track drive gears by the centrifugal method. Only machine operations required on castings are boring inside diameter and drilling holes.

CENTRIFUGAL POURING EFFECTS HUGE SAVINGS IN LARGE CANADIAN FOUNDRY

Huge savings are being made in money and materials in one of the world's largest foundries by casting numbers of similar parts at one time in Christmas tree clusters by the centrifugal method.

This work is speeded by the use of a Cleveland Tramrail overhead materials handling system that transports hot metal directly from the furnaces and pours it into the spinning molds without rehandling. Electric hoists pick up the poured molds and deliver them to the shake-out.

Centrifugal pouring has brought about tremendous savings both in materials and labor. Because of the accuracy with which parts can be cast, very little machining is required and machine-tools are saved.

Cleveland Tramrail equipment is ideally suited for this work. It eliminates heavy lifting, aids safety and makes possible top production.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
1125 EAST 283rd ST. WICKLIFFE, OHIO.

CLEVELAND TRAMRAIL

OVERHEAD MATERIALS HANDLING EQUIPMENT

CO-6

TYPICAL ANALYSIS

C	W	Cr	Va	Mo	Co
88%	5.50%	4.00%	1.75%	4.50%	9%

Resists wear and abrasion . . . increases efficiency . . . assures maximum production

EASY TO HEAT-TREAT

Preheat at about 1450°F;

Harden at 2220° to 2260°F;

Quench in oil or air.

Double-draw at 1050°.

In every plant there is a tough machining job where Tungsten Cobalt High Speed Steels were formerly used. Nowadays, however, they are rapidly being replaced by the Tungsten-Molybdenum-Cobalt type, such as Latrobe's CO-6, with excellent results.

You'll find that CO-6 equals, and in many cases exceeds, the performance of the 9% Cobalt Tungsten types. CO-6 is ideal for machining armor-plate, lathe beds, tank-rings, bearing races, car wheels, locomotive tires and other heavy-duty cutting applications where hardened or semi-hardened parts are involved. In ordering, unlike the Tungsten types, CO-6 need not be balanced with any other steel.

Heat-treating is simple. There is no danger of decarburization in hardening. CO-6 will prove tougher for many uses and provide cutting edges without any tendency to flake.

Our metallurgical staff will be glad to advise on the adaptability of CO-6, described in our new technical bulletin. Write for your copy.

LESCO
TOOL STEELS FOR VICTORY

LATROBE
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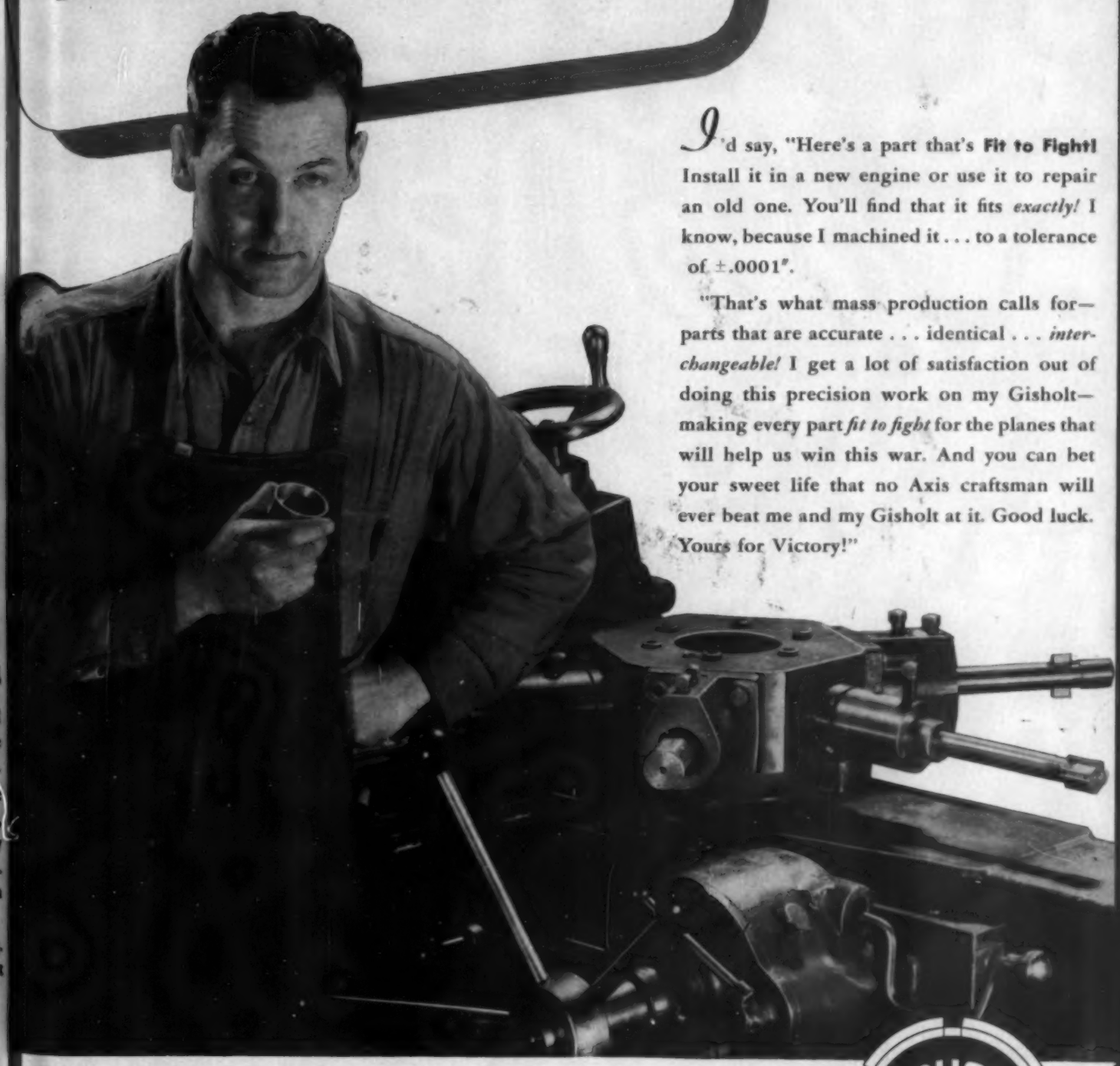
MAIN OFFICES *and* PLANT • • • LATROBE • PA•

I'D LIKE TO SEND A NOTE WITH THIS!



I'd say, "Here's a part that's **Fit to Fight!** Install it in a new engine or use it to repair an old one. You'll find that it fits *exactly!* I know, because I machined it . . . to a tolerance of ±.0001".

"That's what mass production calls for—parts that are accurate . . . identical . . . *interchangeable!* I get a lot of satisfaction out of doing this precision work on my Gisholt—making every part *fit to fight* for the planes that will help us win this war. And you can bet your sweet life that no Axis craftsman will ever beat me and my Gisholt at it. Good luck. Yours for Victory!"

ok Ahead..Keep Ahead..With Gisholt Improvements in Metal Turning

At Gisholt, the Army-Navy "E" and the Treasury Flag fly side by side

ARMY E NAVY

GISHOLT MACHINE COMPANY

1217 East Washington Ave. • Madison, Wis.

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES

DESIGNS for the FUTURE

Bohn research and engineering have developed many non-ferrous improvements. Each one of these steps is of far-reaching importance to industrial America.

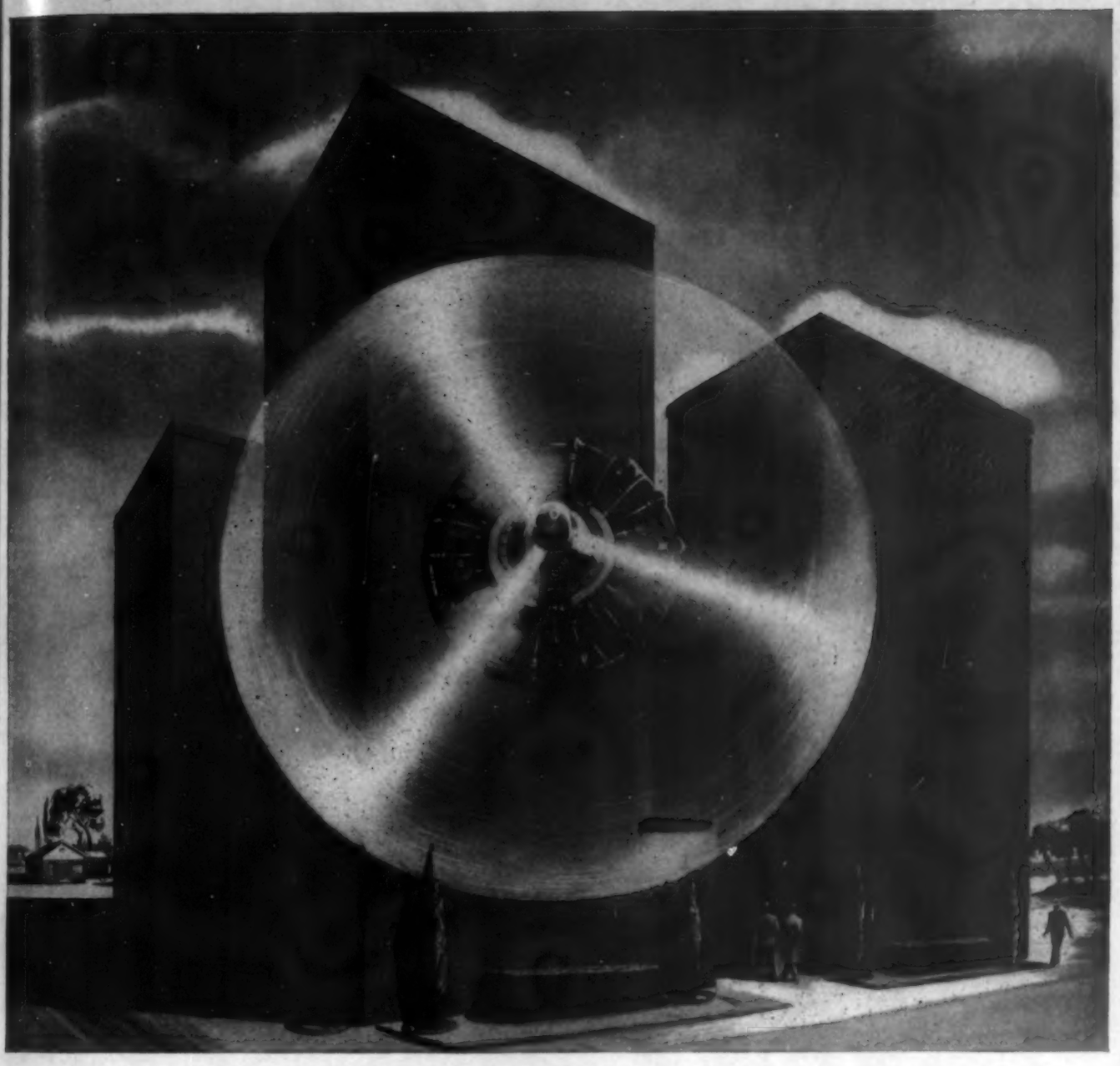
Business leaders more and more consult this organization because of our advanced knowledge and wide experience. Maybe some day, Bohn engineers can design and fabricate some product for you. Today all of our efforts are on war materials.

But later, let's talk to each other about how we might be of assistance to your company. We make it our business to find new ways to produce better things for less money.

BOHN ALUMINUM AND BRASS CORPORATION
GENERAL OFFICES—LAFAYETTE BUILDING • DETROIT, MICHIGAN
Designers and Fabricators
ALUMINUM • MAGNESIUM • BRASS • AIRCRAFT-TYPE BEARINGS

Know the Name

BOHN



Cave-of-the-Winds in Miami

Inside this unique building, the engines of Pan American Clippers are put through their paces. Propellers roar with the thunder of 4000 horsepower—creating super-hurricanes as air is pulled down one set of stacks and pushed out through the other set.

Outside, there's hardly a sound—for in each stack a honeycombed unit of cells soaks up the resonance, bit by bit, until it is finally dissipated.

Naturally, this completely windowless test house had to be air conditioned—to remove heat generated by the engines, to provide controlled testing temperatures, to make working conditions bearable for the engineers. As in so many other exacting applications of air conditioning and industrial refrigeration, the equipment selected was General Electric.

Today, G-E air conditioning and refrigeration engineers are devoting all their talents to problems of war production and testing. They are learning much that will lead to better, more economical manufacturing methods—to healthier, happier living—when we return to the pursuits of peace.

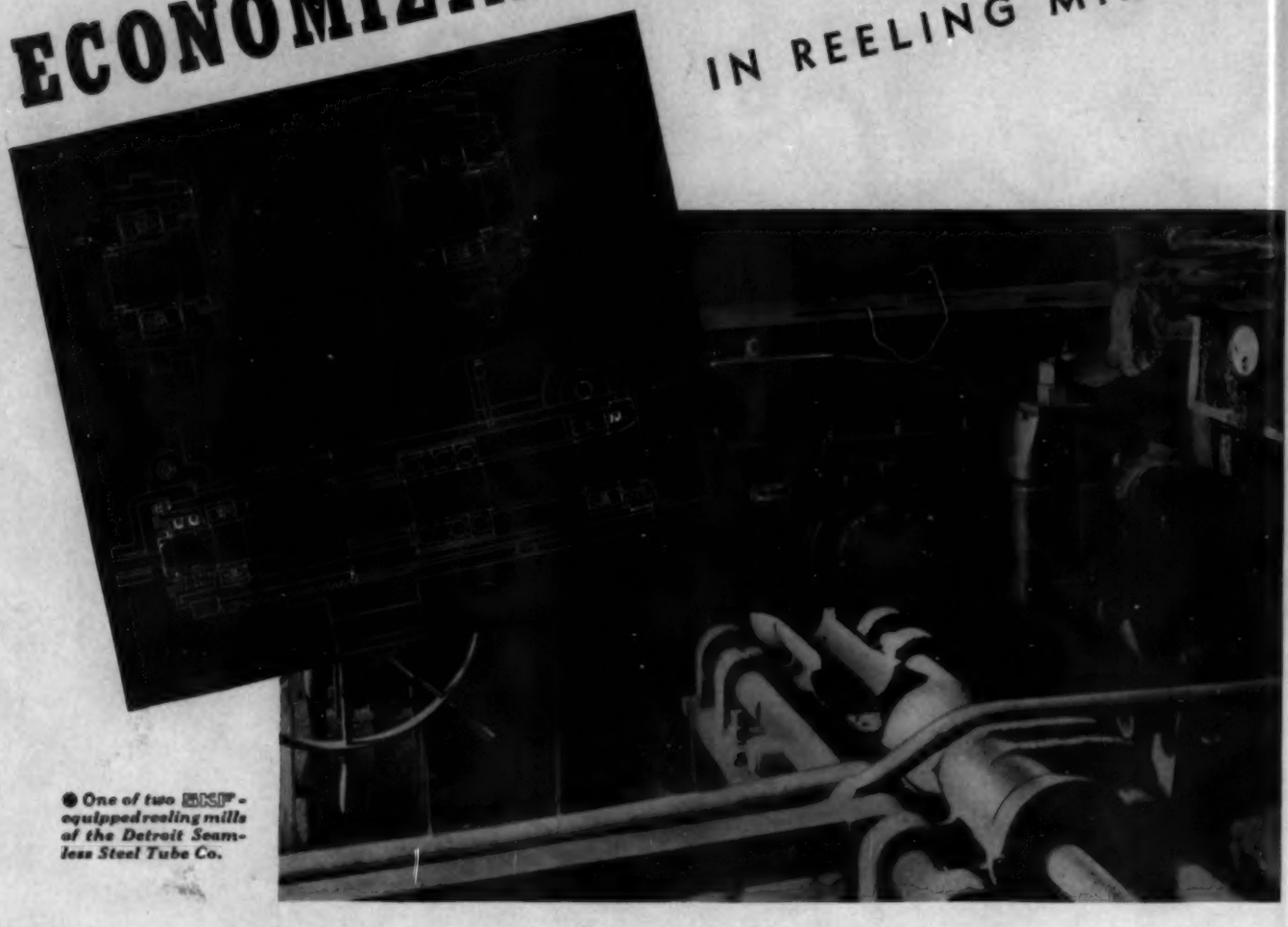
Air Conditioning and Commercial Refrigeration Department, Division 437, General Electric Company, Bloomfield, New Jersey.

Air Conditioning by

GENERAL ELECTRIC

ECONOMIZING ON SPACE

IN REELING MILLS



● *One of two SKF-equipped reeling mills of the Detroit Seamless Steel Tube Co.*

Economizing space was solved by the men who replaced plain bearings on this reeling mill with SKF Spherical Roller Bearings. Because their rolling alignment is built in, SKF's eliminate the need for space-taking, self-aligning housings. Thus, space is made available for maximum shaft strength and bearing capacity. Routine plain bearing adjustments and replacements are eliminated, and rolls keep their proper setting. Where change-over is the secret of lengthening the life of existing equipment, the new bearings are usually SKF. 5335

SKF INDUSTRIES, INC., PHILADELPHIA, PENNA.

Instant response — unfailing action in every mechanical element of the ship — is vital to protect the lives of the crew as well as giving striking power to the submarine. From his station, the commander skillfully directs its performance through centralized control equipment.

★ ★ ★

The centralized controls of Milwaukee Milling Machines give the operator complete command of his machine — enable him to control its performance to the fine degree he demands for the full expression of his skill.

Speed and feed dials — all control levers within easy reach — the latter duplicated front and rear on plain and universal horizontal machines (model 2K and larger) — contribute to the sustained precision of Milwaukees, in the tool room or on the production line.

KEARNEY & TRECKER
CORPORATION
MILWAUKEE, WISCONSIN

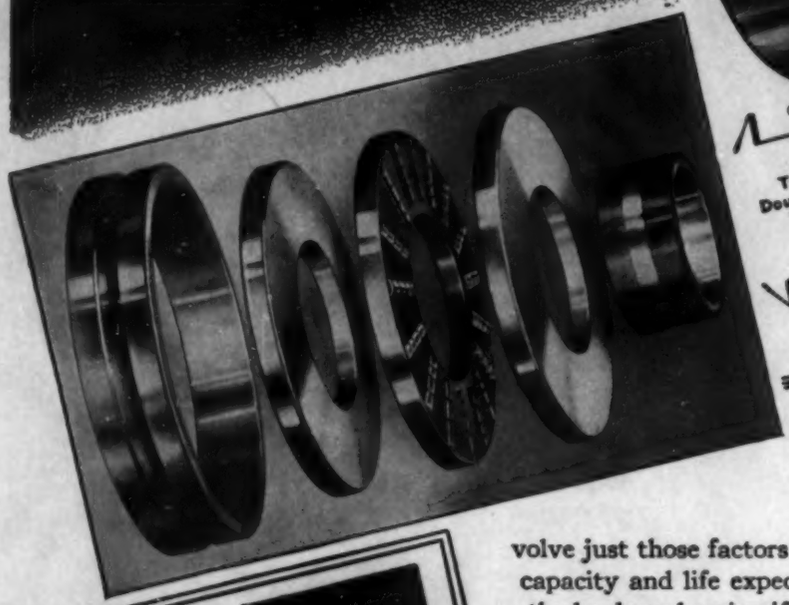
Buy Victory with at least 10% in War Bonds!

Milwaukee **MACHINE TOOLS**

ROLLWAY'S

Right-Angle

BEARING LOADING *is the* RIGHT LOADING!



Especially

FOR

1. higher bearing capacity in the same dimensional limits
2. oscillating or shock loads
3. heavy thrust loads
4. continuous operation without cool-off
5. longer bearing life under all loads

● The advantages of Rollway's right-angle bearing loading are so self-evident as to be axiomatic. They involve just those factors that are used in computing the carrying capacity and life expectancy of *every* bearing. In short, reduce the load per bearing if you want to lengthen the life, counteract shock and vibration, or provide freer running.

Rollway Splits Each Load Into Two Parts

Rollway *reduces the load carried per bearing* by the simple expedient of splitting each load into its two simplest components of pure radial and pure thrust. Each of these two components is carried by a separate bearing assembly, and always at right-angles to the roller axis. There are no compound loads, no oblique resultants, to complicate design and pile up stresses. And there is no wedging or pinching of rollers, therefore, markedly less rubbing friction and wear-back of the roller heads.

For longer bearing life, more efficient performance and more economical maintenance . . .

FOLLOW THIS BASIC BEARING PRINCIPLE

- All radial loads carried at right angles to the roller axis.
- All thrust loads carried at right angles to the roller axis.

Standard Sizes for Most Applications

● S.A.E. or American Standard metric dimensions and tolerances in a wide range of sizes and types assure low cost and ready availability for most applications. Let our engineers recommend the types best suited to your needs. Send sketch, drawing, or detailed description for free confidential bearing analysis and recommendation. No obligation.

ROLLWAY BEARING COMPANY, INC., SYRACUSE, NEW YORK

BUILDING HEAVY-DUTY BEARINGS SINCE 1908 **BEARINGS**

Mr. DAG

"LET'S GET ON WITH THE WAR" *these free booklets will help . . .*

These 5 free booklets on dag colloidal graphite can help you in more ways than one. Each covers a different use or group of uses for dag products in industry. If you haven't used dag colloidal graphite or don't know all these uses meet Mr. dag today by writing for one or more of the booklets. Just clip the coupon.

ASSEMBLING AND RUNNING-IN ENGINES AND MACHINERY

Lists 10 advantages of adding **dag** colloidal graphite to liquid lubricants for these operations and tells why with photographs, charts, and simple, non-technical text.

BULLETIN No. 421

PARTING COMPOUNDS

Tells how **dag** dispersions prevent objectionable freezing, rusting or sticking together of metals and other materials. Cites use on screw threads, lamp bulbs, aviation and driving equipment; also in glass, rubber and foundry industries.

BULLETIN No. 422

HIGH TEMPERATURE LUBRICATION

How **dag** colloidal graphite takes over when the going gets too hot for conventional liquid lubricants. Gives examples in forging, oven conveyors, kiln cars, bottle and die casting machines, etc.

BULLETIN No. 423

"dag" COLLOIDAL GRAPHITE FOR IMPREGNATION AND SURFACE COATING

of textiles, asbestos, felt, abrasives, porous metals, paper, wood, etc. to impart lubrication properties, electrical conductivity, opacity, color, or other desirable qualities.

BULLETIN No. 431

GENERAL BOOKLET

The story of **dag** colloidal graphite. 12 pages fully illustrated. Gives the how and why of colloidalization, explains the various liquid carriers and suggests dozens of places where **dag** dispersions can speed up production.

BULLETIN No. 430

dag COLLOIDAL PRODUCTS

ACHESON COLLOIDS CORPORATION
Port Huron, Michigan

Please send me free copies of the bulletins checked below:

No. 421 ☐ NAME_____
No. 422 ☐ COMPANY_____
No. 423 ☐ POSITION_____
No. 430 ☐ ADDRESS_____
No. 431 ☐ CITY & STATE_____

Our Present Oil Supplier Is_____

(Lubricants containing **dag** colloidal graphite are available from major oil companies.)

Dept. AZ

"dag" is the registered trademark of Acheson Colloids Corporation

O W I Photo by Palmer, in an Allegheny Ludlum Plant

Final Examination

BEFORE STAINLESS GETS ITS WINGS

REDUCE ACCIDENTS!

In 1941, accidents were first cause of death among men from 22 to 38 years of age. The productive man-days lost were enough to build twice as many battleships as now possessed by the combined Allied Navies. These are losses that *can* be avoided. Warn your employees repeatedly not to take risks on or off the job—cooperate in every way possible with the National Safety Council's *War Production Fund to Conserve Manpower,* William A. Irvin, National Chairman, Chrysler Building, New York City.

A GREAT DEAL of costly processing is done on stainless steel, to secure the physical characteristics and surface finish required for the particular war job it is to perform. But one day all the hot and cold rolling, heat treating, and pickling, grinding or polishing is completed, and bright sheets of Allegheny Stainless lie on protective layers of heavy paper, ready for final inspection and shipment to the war plants.

They're *right,* those sheets—flawless of surface and true to desired specifications. Only one essential remains: that they be used as carefully as they were produced—fabricated with an absolute minimum of rejects, spoilage, undue scrap, or waste in any form. • Call on us for any printed data or personal help.

ADDRESS DEPT. S-6

Allegheny Ludlum
STEEL CORPORATION
BRACKENRIDGE PENNSYLVANIA

A-8823 . . W & D

Installation of a motor-operated unit with variable speed is recommended for circular work.

Hand-operated unit, used by woman welder with set-up of several similar pieces . . . a real time saving.

Now . . . A 500-POUND WELDING POSITIONER BY RANSOME . . . *Motor or Hand-Operated*

The elevating sub-base is a big help in handling large unwieldy pieces.

Showing the importance of the 45° "down-under" position, eliminating resetting of work. The double-end pipe flange shown is typical.

Here's a versatile machine that will help you do better welding faster . . . on a wide variety of work. It's top-quality equipment and ideal for women welders.

- **Table top tilts to 135° from horizontal (45° beyond vertical).**
- **T-slots in table top simplify clamping of work.**
- **Handles a 500 lb. load with a 6-inch center of gravity and a 6-inch eccentricity.**
- **Cut gears are used throughout.**
- **Clutch permits free rotation of table top, by hand.**
- **Available with elevating base, to give 42 inches from floor to table top.**
- **On motorized machine, Reeves variable-speed drive gives range up to 1 r.p.m. for table rotation. Choice of power or hand-wheel tilting.**

Other Ransome Positioners cover a range of types and sizes up to 20 tons. ***Write for literature*** . . . and for recommendations to meet your particular needs.

Ransome WELDING POSITIONERS

INDUSTRIAL DIVISION • RANSOME MACHINERY COMPANY • DUNELLEN, NEW JERSEY

With this group of

YOU CAN GREATLY SPEED U

The new Lamson Lock Nut keeps assemblies tight which are subject to severe vibration or shock. Locking crown section, elliptical in shape after heat treatment, grips bolt thread like a vise. One-piece design, can be used repeatedly. Widely used in Ordnance and Naval applications. U. S. Patent No. 2255286.

Lamson Fastener Units are available in 8-32 to 5/16" diameters, and in lengths up to 1½". All standard head styles. Shakeproof or helical spring washer types optional. Prevents lost washers, keeps inventory of screws and washers identical, and can be used in automatic hopper feed drivers.

Dardelet Self-Locking Screw Threads may be applied to any type of bolt. Dardelet bolts are unaffected by vibration, loss of initial bolt tension or wear. They have higher tensile and impact strength, and greater endurance limit than standard threads.

The Weather-tight bolt is for wood construction. Head of this bolt sets flush with surface of wood without counter-boring. Prevents moisture seepage beneath head and from nut end as well. Tapered splined shanks prevent turning when nut is applied. U. S. Patent No. 2056688.

Lamson Hardened Sheet Metal and Self-Tapping screws are made in three standard types for metal and plastic assemblies. Types "A", "C" and "Z" are available with conventional slot or Phillips' Recessed Head.

Phillips' Recessed Head screws are made in all sizes with both standard machine screw threads and hardened self-tapping screw threads. Hand or power driven screw drivers do not slip out of recessed head.

ffastenings for assemblies

ED UP YOUR PRODUCTION

● Here are six *standard* Lamson products, each one of which is certain to speed up your assemblies. Each one has definite advantages, but all have one characteristic in common—*they speed up assemblies.* And right now, during this war, speed in assembly is an imperative requirement.

Since these are all *standard* products—they are *made from existing tools and dies in our shops.* All of them are made of carbon steel, heat treated to obtain proper physicals. Whether you use ten hundred or ten million of any one of them, there will be no measurable variation in their quality, their strength or their fit.

Now if you design your product to use these *standard* fastenings instead of a "special" made to specifications, you will enjoy some immediate advantages that no "special" can give you. For instance, you can have a choice from among many *standard* sizes. You can actually get them "out of stock"—and probably from more than one source of supply. (A "special" means not only making up special tools and dies, but means special handling right on through our plants at every stage of manufacture, inspection and shipment. And that wastes time that you may need.)

So, design to use one or more of these standard products if you can.

Remember that each one of these products has some *special advantage, some special feature* that aids you in *speeding up your assemblies.* Take Lamson Lock Nuts for example. They are not only a positive nut lock, but they may be used over and over again without impairment of their locking action. Or take Lamson Weather-tight Bolts, and compare their advantages with ordinary Carriage Bolts. These new bolts make "*weather-tight*" assemblies, *better looking* assemblies, and *safer* assemblies. You do not need to counter-bore to make them fit flush with a surface, thus eliminating one operation and speeding up your assembly. Hence they cost less to use.

Besides the two Lamson specialties we mention, there are shown here Lamson Dardelet bolts and Dardelet "Rivet-Bolts"; Phillips Recessed Head (as well as slotted head) sheet metal screws; and, of course, Lamson Fastener Units assembled with various types of lock washers.

With all these efficient types and kinds of *standard* fastenings to select from—you have a natural "priority" on deliveries.

Samples in the size you need of any of these Lamson *standard* products can be sent you, *and quickly,* for any tests you care to make. And if you can use them in your war production, you can be assured that you can get what you need much more promptly than if we have to make up a "special" type, size and kind of fastening for you.

We will gladly send you special literature describing these various Lamson *standard* products on request. Just ask for bulletin describing one or more of them.

THE LAMSON & SESSIONS COMPANY, 1971 W. 85th St., Cleveland, O.

These four books will help you in specifying and buying "standard" bolts, nuts and "specials"

THE LAMSON BLUE BOOK—is our complete Catalog of standard products excepting our Aircraft products.

"BOLTS, NUTS & SCREWS"—70 pages of technical and practical information. First copy gratis, requested on your letterhead. Additional copies one dollar each.

"BOLT, NUT & RIVET STANDARD"—175-page book published by the American Bolt, Nut & Rivet Manufacturers Association, 1550 Hanna Bldg., Cleveland, O. Price one dollar per copy. (Order from publishers, please.)

"SIMPLIFIED STOCK LIST"—of bolts, nuts and screws, conforming to latest revisions of the Office of Price Administration, and of great value in showing you in what ratio quantities of various standard products are kept in stock for deliveries, by your jobbers and in our own (and other bolt manufacturers') warehouse stocks.

Buy U. S. War Bonds and Stamps—an investment in America

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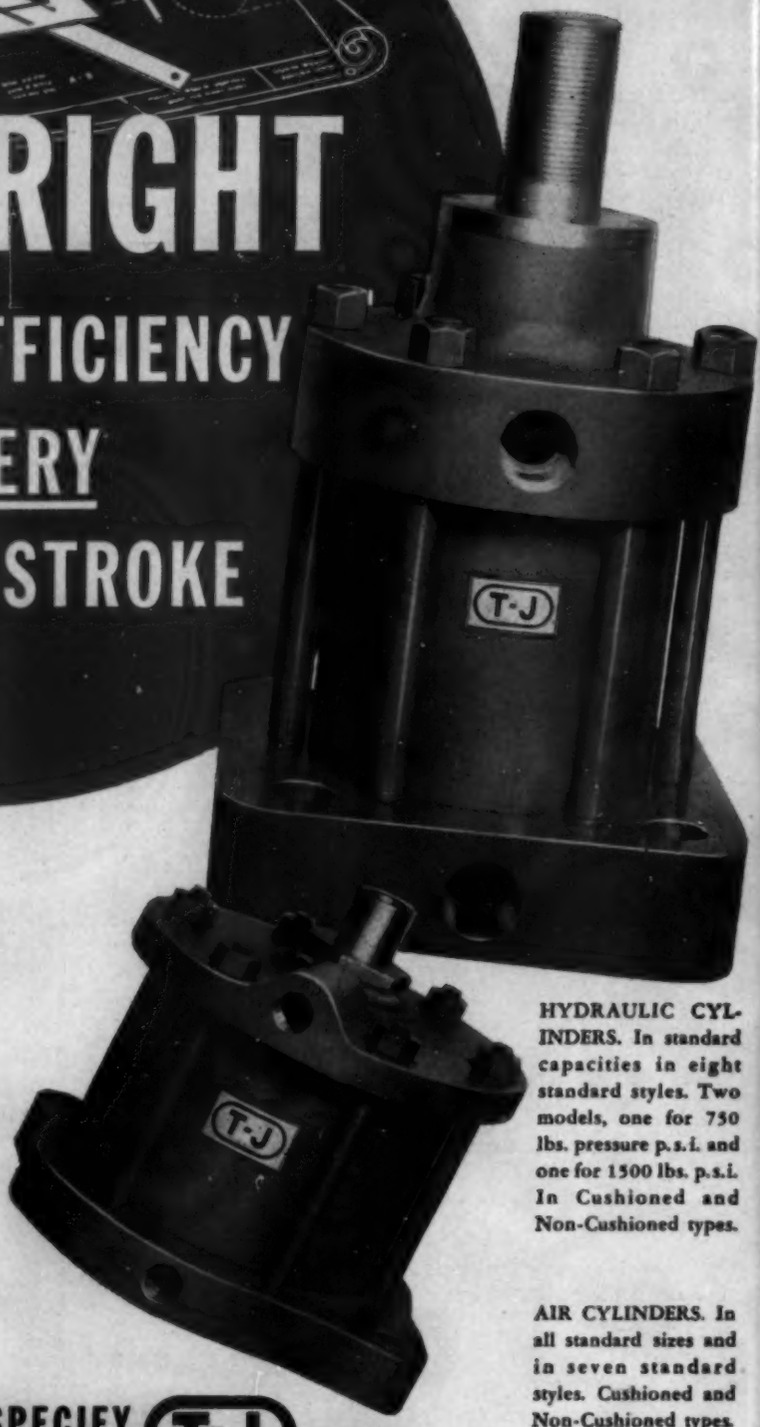
Your Jobber Stocks the Lamson Line

BUILT RIGHT

FOR TOP EFFICIENCY IN EVERY CYLINDER STROKE



T-J AIR AND HYDRAULIC CYLINDERS are *accurately machined* to assure *right* mounting and highly efficient performance. The mounting surfaces are parallel with (or at right angles to) the bore of the cylinder. All surfaces are strictly inspected for squareness and smoothness. All mounting holes are drilled—not just cored. T-J engineering and experienced workmanship assure *maximum power movement*...long dependability. Write for latest catalogs on T-J Cylinders. The Tomkins-Johnson Co., Jackson, Mich.

HYDRAULIC CYLINDERS. In standard capacities in eight standard styles. Two models, one for 750 lbs. pressure p.s.i. and one for 1500 lbs. p.s.i. In Cushioned and Non-Cushioned types.

AIR CYLINDERS. In all standard sizes and in seven standard styles. Cushioned and Non-Cushioned types.

FOR TOUGH JOBS...SPECIFY T-J

TOMKINS-JOHNSON

RIVITORS...AIR AND HYDRAULIC CYLINDERS...CUTTERS...CLINCHORS

IT HAD TO COME...

this better Calibration Plate

P&H

Modern developments in welding electrodes have imposed new and more complex problems upon users. Now, with the many new variations in electrode coatings, accurate results require that you know what your WSR ratings are so that you can select exactly the right heat across the arc for each electrode.

To help you weld more efficiently . . . to take full advantage of present and future advancements in electrodes . . . P&H has developed the new "Visi-matic" Calibration Plate. Simple, easy to read, it eliminates guesswork by permitting you to select the *exact* heat required for each size and type of electrode.

As with other P&H advancements, the one thought behind the new "Visi-matic" Calibration Plate is to help you make *better welds, more easily, at lower cost.*

See Next Page ☛

NOW
ACCURATE HEAT CONTROL
is a simple matter

WELDING AMPERES
DIRECTION OF ROTATION
INSTRUCTIONS FOR OUTPUT SETTING
GREEN BAND
USE FOR MEDIUM VOLTAGE ELECTRODE - GRADE E-6010
ARC VOLTAGE RANGE 22-32 VOLTS
YELLOW BAND
USE FOR LOW VOLTAGE ELECTRODE - GRADE E-6012
ARC VOLTAGE RANGE 20-25 VOLTS
CONSULT YOUR ELECTRODE SUPPLIER FOR PROPER ARC VOLTAGE AND WELDING CURRENT
HARNISCHFEGER CORP. MILWAUKEE, WIS., U.S.A.

The new P&H "Visi-matic" Calibration Plate provides three color bands, corresponding to the three electrode groups for low, medium, or high voltage requirements.

Settings Provide For Varying Heat Requirements

Calibrated in amperes, the new "Visi-matic" Plate is used with any make of electrode. Not only does it enable you to compensate for variations in voltage with the amount of current or amperes, but also for the variations in coatings as illustrated by the typical electrodes below:

Down Hand
—Coatings burn off at a much slower rate than metal and therefore require higher voltages to insure ample heat across the wider arc gap.

All Position
—Coatings burn down more slowly than metal but the difference is not so great as in Down Hand.

Poor Fit
—Metal and coatings burn at approximately the same rate of speed. Amperage requirements are the lowest of the three groups.

By merely setting the stylus at the dot opposite the desired amperage, you are sure of the correct heat across the arc *on every job.*

WSR (*Welding Service Range*) Ratings

All P&H Arc Welders are rated on WSR which is actual delivered output. You know exactly how much heat your machine will deliver from minimum to maximum.

Single Current Control

With P&H's single control, you have but one simple adjustment to obtain *any* welding heat within the machine's range. Arc response is automatic on all classes of work—with all types of electrodes.

P&H's outstanding advantages are: (1) Known Welding Service Range; (2) "Visi-matic" Calibration; and (3) Automatic Arc Response—all of which are accomplished with (4) Single Control for Welding Heat. Literature will be sent on request.

P&H ARC WELDERS

The complete line of P&H Arc Welders includ both A.C. and D.C. types in a wide range of capaciti All machines are rated on WSR (Welding Servi Range). P&H also manufactures a complete line welding electrodes.

HARNISCHFEGE CORPORATION

ARC WELDERS • EXCAVATORS • ELECTRIC CRANES P&H MOTORS • HOISTS • WELDING ELECTRODES

GENERAL OFFICES: MILWAUKEE, WISCON

Canadian Distribution: **The Canadian Fairbanks-Morse Co.**

July

SEE MORE PRODUCTION

THROUGH CIRCLE "C" SUPER HIGH-SPEED STEEL

In shop after shop, **CIRCLE "C"** is helping to break earlier high-production records.

Today's grim war-demands have revealed hitherto unrecognized advantages in using this truly **"SUPER"** high-speed steel for machining the tough, hard, alloy steels that go into America's latest weapons and equipment for victorious warfare.

There are definite applications where **CIRCLE "C"** is yielding at least 25% faster machining speeds, as compared with ordinary high-speed steels—for example, in airplane-engine production.

The new bulletin (No. SL-2005) tells more.

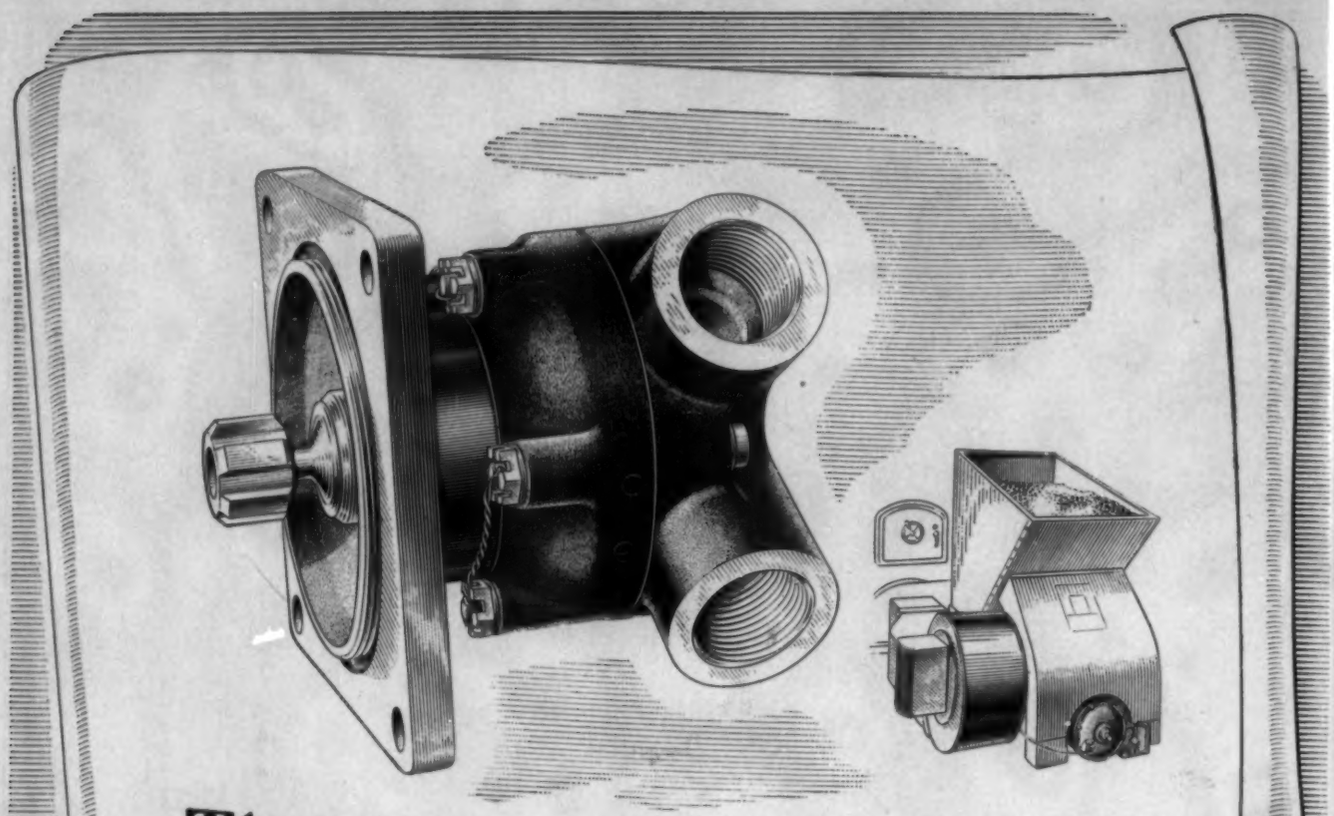
Send for
BULLETIN SL-2005

ARMY E NAVY

Firth-Sterling
STEEL COMPANY

Also makers of "FIRTHITE" Tungsten-Titanium Carbides for steel cutting

Offices: McKEESPORT, PA. NEW YORK - HARTFORD - PHILADELPHIA - CLEVELAND - DAYTON - DETROIT - CHICAGO - LOS ANGELES



The Aircraft Pump Learned How to Reduce from the Stoker

YOU'D hardly expect an airplane pump to have even a nodding acquaintance with a coal stoker. Down-to-earth, extremely rugged, the stoker is built with heavy service conditions uppermost in mind. It's no surprise, then, to find Torrington Needle Bearings on the job—with their high load-carrying capacities, and ease of lubrication.

With aircraft pumps, the story is somewhat different. Here the design problem was not so much one of ruggedness as keeping size and weight down to an absolute minimum. But the fact that no special means of lubrication need be provided with the Needle Bearing soon had the pump people "weighing" its other advantages, with an eye to simplifying design and increasing production efficiency.

Everyone of its features, they found, fitted right into the military airplane picture. The Needle Bearing's compactness squarely met the problem of space limitations invariably encountered in aircraft design, and contributed importantly, also, to weight-reduction. While long-life, low-cost, and ready availability for essential applications are among the significant "little things" which enabled the industry to meet and top the staggering production demands of the Government's airplane program.

NOW CONSIDER YOUR OWN POSTWAR DESIGNS

Isn't there an idea in the Torrington Needle Bearing which you might use to good advantage in your postwar designs? Tomorrow's most-wanted products will be considerably lighter, yet capable of heavier loads . . . longer-lasting, yet requiring practically no maintenance attention. Let Torrington engineers show you how you can give your product these and other new-day advantages of the Needle Bearing. As preliminary information, a list of typical applications in Catalog 110 may prove helpful to you in postwar planning.

NEEDLE BEARINGS—ALL TYPES—ALL SIZES

NEEDLE BEARINGS TYPE DC are complete, self-contained units consisting of a full complement of rollers and a drawn, hardened outer race. They offer the advantages of small size, low cost, high capacity—and easy installation.

NEEDLE BEARINGS TYPE NCS consist of a full complement of rollers and a relatively heavy hardened outer race. They are furnished with or without inner races. Needle Bearings Type NCS are adaptable to heavier loads than Needle Bearings Type DC.

NEEDLE ROLLERS TYPE LN are produced in a range of sizes for assembly into low-cost, high-capacity anti-friction bearing units. They are designed for use in applications which require assembly of the bearing on the job.

THE TORRINGTON COMPANY

Established 1866 • Torrington, Conn. • South Bend, Ind.

Makers of Needle Bearings and Needle Bearing Rollers

New York · Boston · Philadelphia
Detroit · Cleveland · Seattle
San Francisco · Chicago · Los Angeles
Toronto · London, England

TORRINGTON NEEDLE BEARINGS

TOUGH JOBS like drilling and tapping 6" holes in heat-treated steel armor plate require tough machines like the 150-ton giant shown above.

This Universal Drilling and Boring Machine was made by Consolidated especially for this type of work. It's a brute for strength—built to handle the toughest assignments and ask for more! A number of these machines are performing valiant service to our Victory program by greatly facilitating the manufacture of armor plate for battleship construction and for gun turrets.

Machine tools like this are typical of Consolidated skill and craftsmanship. If you have a special machine tool problem, we would be glad to work with you on its solution.

TS • BETTS-BRIDGEFORD • NEWTON • COLBURN • HILLES & JONES • MODERN

ONSOLIDATED

ACHINE TOOL CORPORATION

ROCHESTER, NEW YORK

Our Field Is To Guard Production From

SELF SABOTAGE

MAGNAFLUX SERVICE

As originators and pioneers of the Magnaflux methods, Magnaflux Corporation and its engineering staff have accumulated an unequalled fund of specialized knowledge and experience on this subject. This is placed at the disposal of industry in the service which is extended to Magnaflux users. Included are: training for operators, all necessary text books, regular contacts by field engineers, laboratory services, etc.

In the tense struggle for volume production, the completed plane, tank or machine can be effectively sabotaged by one uninspected and defective part. At that moment, which can occur disastrously in the heat of battle, production defeats itself.

Magnaflux Corporation, originators of inspection methods to indicate probable points of failure before assembly, recognizes this as a broad field of research. In addition to magnetic particle indications by basic Magnaflux methods, many refinements of technique and equipment have been developed. The recently announced Magnaglo fluorescent material which heightens the visibility of indications is an outstanding example.

By constant exploration of their selected field Magnaflux engineers recently added, in Zyglo, a method for revealing surface discontinuities on non-magnetic metals, plastics and ceramics.

Your company will find in Magnaflux Corporation, more than a manufacturing and service organization—a solidly-grounded research staff seeking the fullest benefits within the field of production line inspection.

MAGNAFLUX CORPORATION

5912 Northwest Highway, Chicago

NEW YORK · DETROIT · LOS ANGELES · DALLAS

THE ANSWERS TO QUESTIONS LIKE THESE:

What is "Gear-Shaving"?

How does it work?
How accurate is it?
How does it compare with other methods?

Where Can It Be Used?

What kind of gears can be shaved?
Who is using "gear-shaving" today?
How many machine types and sizes are there?
How big a gear can be finished by "shaving"?
How small a gear can be finished by "shaving"?

What About Cost?

How many different gear sizes and types can be finished on one machine?
When should a rack or a rotary machine be used?
What tool life can be expected?
What does it cost to shave gears?

How Do You Use It?

How do you set up to shave different gear types?

What controls gear accuracy in "gear-shaving"?

What machine type should be used for any given class of gears?

How does it affect gear design?

How does the use of "gear-shaving" affect preliminary gear cutting operations?

What About Curve Shaving?

When should "curve shaving" be used?

When should "curve shaving" not be used?

These and numerous other questions are answered in a new booklet just made available by Gear Production Headquarters. Write for a copy on your company letterhead. Ask for Manual No. GF-43.

MICHIGAN TOOL COMPANY

7171 E. McNICHOLS ROAD . . . DETROIT, U. S. A.

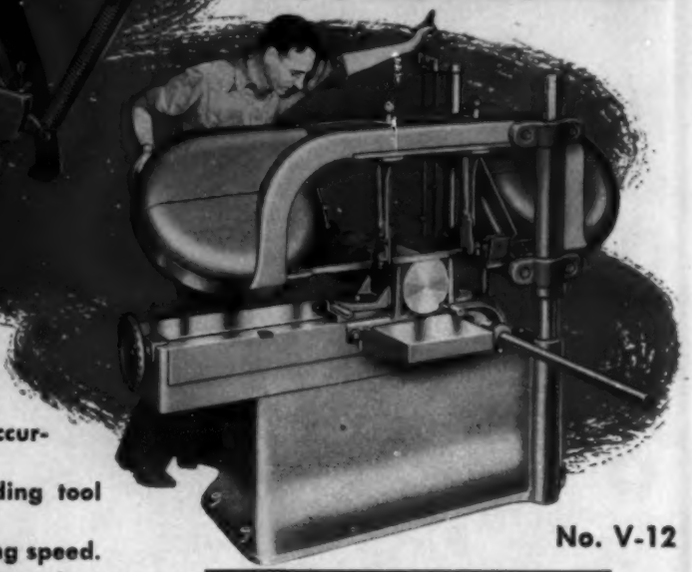
BUY U.S. BONDS STAMPS

12 Reasons Why!

WELLS METAL CUTTING BAND SAWS DO THE JOB . . . BETTER FASTER ECONOMICALLY

No. 8

Wells SAWS



No. V-12

(1) Heavy, rugged construction throughout insures precision work, long life.

(2) Vibrationless operation means truer cutting, faster cutting.

(3) Guides, mounted on heavy, precision machined I beam can be moved nearly flush against work. Accuracy meets standard requirements.

(4) Will cut various metals, of many shapes, including tool steels, stainless steels, etc.

(5) Continuous cutting method assures maximum cutting speed.

(6) Because the saw blade runs cool, it can be operated at the highest speed suitable to the type of metal being cut.

(7) Speed can be regulated — 30, 90, or 130 feet per minute.

(8) Low initial cost for a metal cutting band saw having capacity and quality.

(9) A minimum of moving parts means long service at low maintenance cost.

(10) Low power consumption — 1/2, 1/3 and 3/4 h.p. motor depending on size of saw.

(11) Small floor space — only 24" x 60" for Model 8 and 30" x 73" for Model V-12.

(12) Faster cutting of Wells Metal Cutting Band Saws means fewer man-hours per job.

Ask your Mill Supply dealer to give you a Wells demonstration. No obligation, of course.

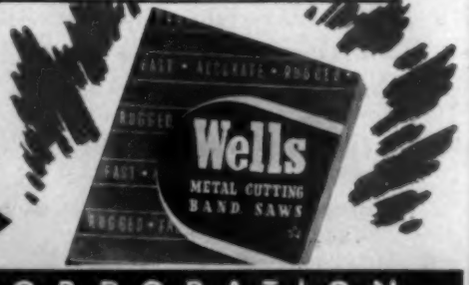
SPECIFICATIONS

WELLS NO 8 METAL SAW

Capacity: Rectangle	8" x 16"
(spec. bowed guides)	5" x 24"
Rounds	8" dia.
Speeds: ft. per min.	60, 90, 130
Motor	Specifications optional

WELLS NO. V-12 METAL SAW

Capacity Rectangle	13" x 16"
Round	13" dia.
Speeds: ft. per min.	30, 90, 150
Guides	Adjustable
Feed	Hydraulic-Controlled
Vise	New quick acting type
Motor	Specifications optional



Write for your copy of the new Wells Catalog

WELLS MANUFACTURING CORPORATION

Wells METAL CUTTING BAND SAWS

1515 FILLMORE STREET • THREE RIVERS, MICHIGAN

Display this poster in prominent spots throughout your plant. Mail the coupon for free copies.

HELP KEEP THE CYLINDERS ON THE MARCH!

Steadily rising demands for oxygen and acetylene gas in war production have created a shortage of the steel cylinders in which the gases are contained.

Vital war weapons now require most of the high grade steel from which cylinders are made; therefore new cylinders are only being produced in relatively small quantities.

Active duty for every oxygen and acetylene cylinder will help beat the shortage, by stepping up cylinder turnover.

You can help by keeping your cylinder inventory as low as possible; by preventing thoughtless waste of gases in welding and cutting; by returning empty cylinders promptly.

Keeping accurate records of the location of cylinders in your plant will also help to expedite the use and return of cylinders.

Working together, we can solve our common problem, and aid America's drive for victory.

Air Reduction

General Offices:
60 EAST 42nd STREET, NEW YORK, N. Y.
IN TEXAS
MAGNOLIA-AIRCO GAS PRODUCTS CO.

WILSON

IDLE CYLINDERS ARE PRODUCTION SLACKERS! *Keep on rolling for victory!*

AIR REDUCTION, Advertising Dept. S
60 East 42nd St., New York, N. Y.

Please send _____ free copies of your "Idle Cylinders" poster to:

Name _____

Company _____

Address _____

A GENERAL PURPOSE CYLINDRICAL GRINDER WITH ADJUSTABLE *Angular* HEAD

Send for fully illustrated folder — it will be mailed free.

This latest of Fitchburg plain cylindrical grinders, the Type "C" Angular Head Grinder, is designed to handle a wide range, and a number of types of jobs. It will cut grinding time and grinding costs.

The Fitchburg Type "C" Angular Head Grinder is adjustable. It has a standard Wheelhead Unit mounted so that it may be located to grind from 0 degrees to a 45-degree angle. The Bowgage head can be swivelled to various positions for standard plain cylindrical grinding, providing a wider range of grinding.

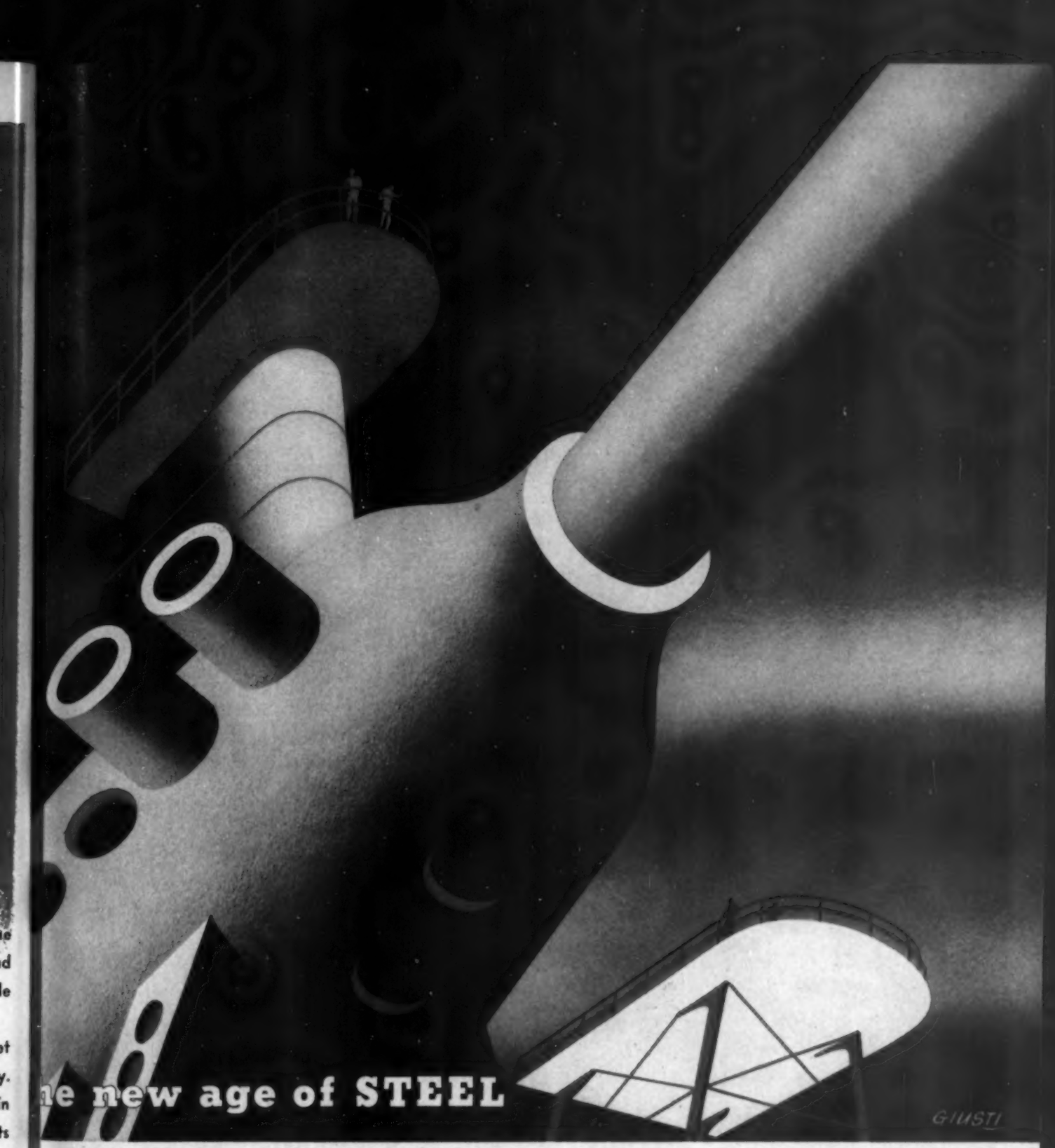
The Fitchburg Type "C" is completely automatic, the workhead is adjustable for various lengths of work and the work spindle can be equipped for single or variable work speeds.

The Fitchburg Type "C" Grinder is designed to meet wartime production speed and maintain highest efficiency. In every detail it meets all the requirements of plain cylindrical and taper grinding — in large or small lots of work, with assured accuracy and fine finish, at low cost. Write for complete information today.

FITCHBURG GRINDING MACHINE CORP.

FITCHBURG, MASSACHUSETTS, U.S.A.

Manufacturers of — Bowgage Wheelhead Units, Multiple Precision Grinding Units, Spline Grinders, Cylindrical Grinders, Gear Grinders, Bath Full Universal Grinders and Special Purpose Grinders



Power of the future. • • • Whether it comes from the harnessing of rivers, from the cracking of atoms or from huge engines burning coal or oil—always there is the problem of application. • • • It is here that the engineer and the creative steel-maker join forces—here that Midvale, specialist in working large masses of steel, will bring skill and knowledge to power transmission of the future.

MIDVALE

Custom Steel-Makers to Industry

***PHILADELPHIA** • New York • Chicago • Pittsburgh • Washington • Cleveland • San Francisco*

One way of looking into the future

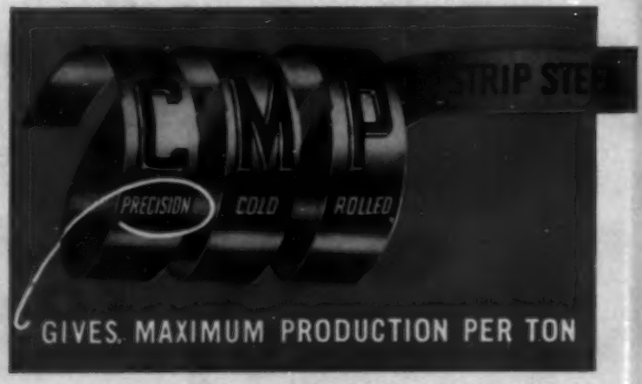
NOTHING difficult or magic about this — all you need do is take a look at the production line battlefronts. There you'll see many a preview of tomorrow's new materials and better methods. For example, CMP precision cold rolled strip steel on the job suggests hundreds of additional peacetime potentials. Why? Well, CMP light gauge strip is successfully replacing critical non-ferrous metals for numerous vital war product applications—such uses were formerly thought neither feasible nor practical. Again, it proved the wide adaptability and versatility of this precision material; and it proves the important part that the specialist contributes to product betterment. Right now is a good time to learn all the facts about CMP strip — the full cooperation and "Know How" experience of the CMP specialized organization is always available, it may help you to a brighter future.

* * *

THE COLD METAL PRODUCTS COMPANY

Subsidiary of the Cold Metal Process Co.

YOUNGSTOWN, OHIO



THE TRANSVERSE TRAVEL METHOD

cuts wide steel sections faster – in the

The Walker-Turner Metal-Cutting Radial Machine has two notable features that enable it to give outstanding performance in cutting wide, comparatively flat metal stock. One is the sliding ram permitting transverse travel of 21½". This enables the blade to feed through the work with a shorter cutting arc and less frictional heat than in other cutting methods.

The second feature is the patented Walker-Turner Geared Motor, the gears of which are fully protected against damage from overload. The shaft operates at the bottom edge of the motor, enabling deep cuts to be made with much smaller wheels than in the conventional motors. The blades being smaller, may also be thinner—effecting a substantial saving in metal. With this machine, it is easy to "trench" or dado, miter and compound miter, as well as make straight cuts. Send for literature.

WALKER-TURNER COMPANY, INC.
5033 BERCKMAN STREET, PLAINFIELD, N. J.

walker-Turner
COMPANY, INC.
PLAINFIELD, N.J.
U.S.A.

MACHINE TOOLS

DRILL PRESSES — HAND AND POWER FEED • RADIAL DRILLS
METAL-CUTTING BAND SAWS • POLISHING LATHES • FLEXIBLE SHAFT MACHINES
RADIAL CUT-OFF MACHINES FOR METAL • MOTORS • BELT & DISC SURFACERS

CONSIDER

THE MACHINING OF A PART LIKE THIS!

SUPPOSE you had a contract to turn out thousands of the highly eccentric spool-like cams pictured here. Consider the work—the man-hours, the expense — of producing them unit by unit. What would your per unit cost soar to? How many rejects would you have to expect? What about the time element? What would happen to your production schedule?

The manufacturer of this cam eliminated those questions by *Turning to Turchan,* the all-hydraulic duplicator. A Turchan Follower, attached to a standard type lathe, proved to be the perfect answer to his problem. They are now produced about 20 times faster than was possible previously.

You, too, can *Turn to Turchan* and save time, money and reject worries.

Turchan Followers attach easily to any standard type lathe, planer, shaper, grinder or mill. They do not interfere with normal use of the machine and what is just as important, they fit equipment you now have in your plant. You do not have to purchase new and expensive machine tools to use a Turchan Follower.

Turchan Followers, made for one, two or three dimensional work, are tops when it comes to die sinking or any other eccentric contour job. Write today for our new illustrated booklet.

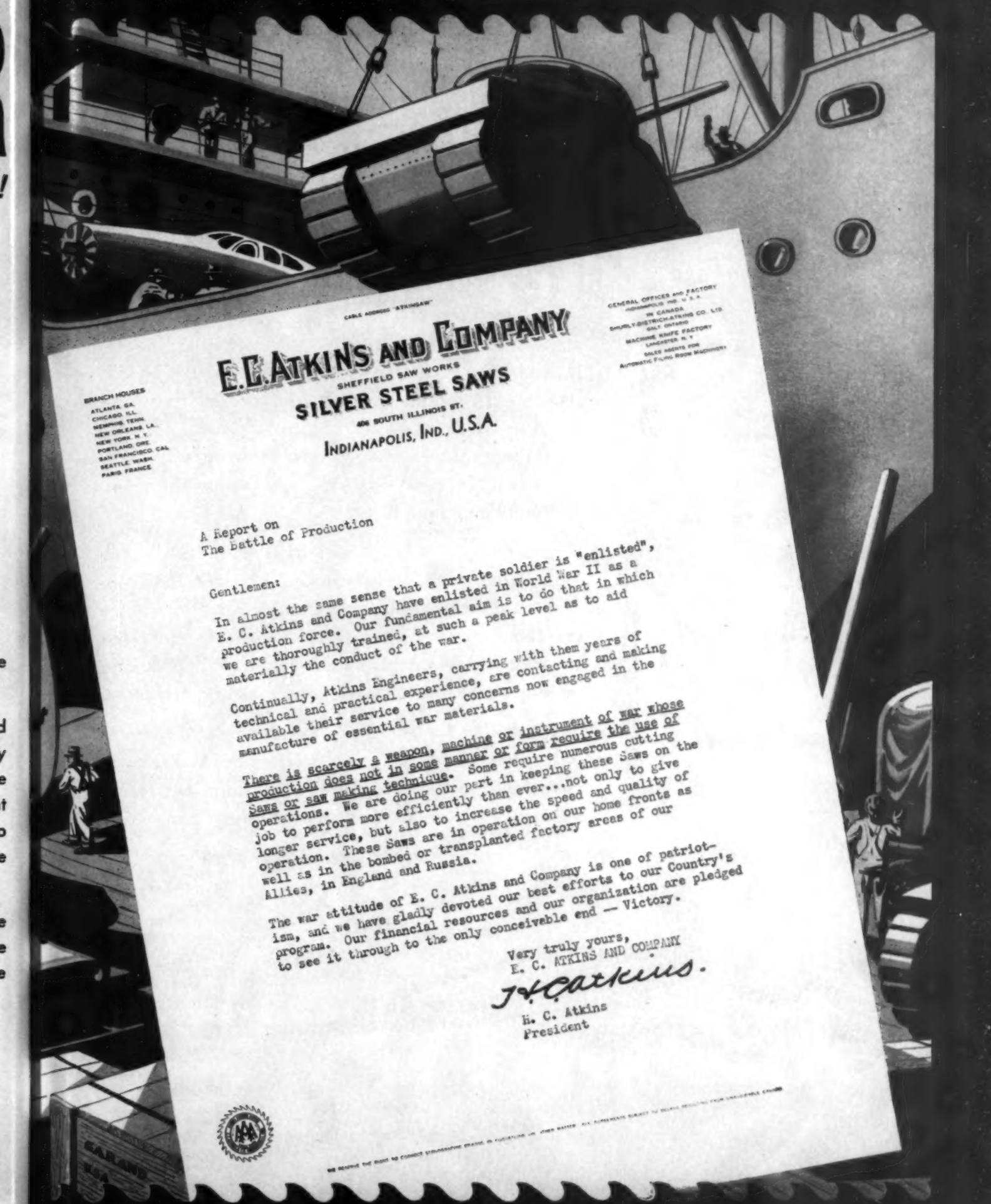
TURN TO *Turchan*

FOLLOWER MACHINE CO.

Originators of Hydraulic Duplicating Attachments

8255 Livernois Avenue — Detroit 4, Michigan

FIRST OF THE TOOLS THAT SHAPE WAR'S WEAPONS



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E. C. ATKINS AND COMPANY
SHEFFIELD SAW WORKS
SILVER STEEL SAWS
406 SOUTH ILLINOIS ST.
INDIANAPOLIS, IND., U.S.A.

A Report on
The Battle of Production

Gentlemen:

In almost the same sense that a private soldier is "enlisted", E. C. Atkins and Company have enlisted in World War II as a production force. Our fundamental aim is to do that in which we are thoroughly trained, at such a peak level as to aid materially the conduct of the war.

Continually, Atkins Engineers, carrying with them years of technical and practical experience, are contacting and making available their service to many concerns now engaged in the manufacture of essential war materials.

There is scarcely a weapon, machine or instrument of war whose production does not in some manner or form require the use of Saws or saw making technique. Some require numerous cutting operations. We are doing our part in keeping these Saws on the job to perform more efficiently than ever...not only to give longer service, but also to increase the speed and quality of operation. These Saws are in operation on our home fronts as well as in the bombed or transplanted factory areas of our Allies, in England and Russia.

The war attitude of E. C. Atkins and Company is one of patriotism, and we have gladly devoted our best efforts to our Country's program. Our financial resources and our organization are pledged to see it through to the only conceivable end — Victory.

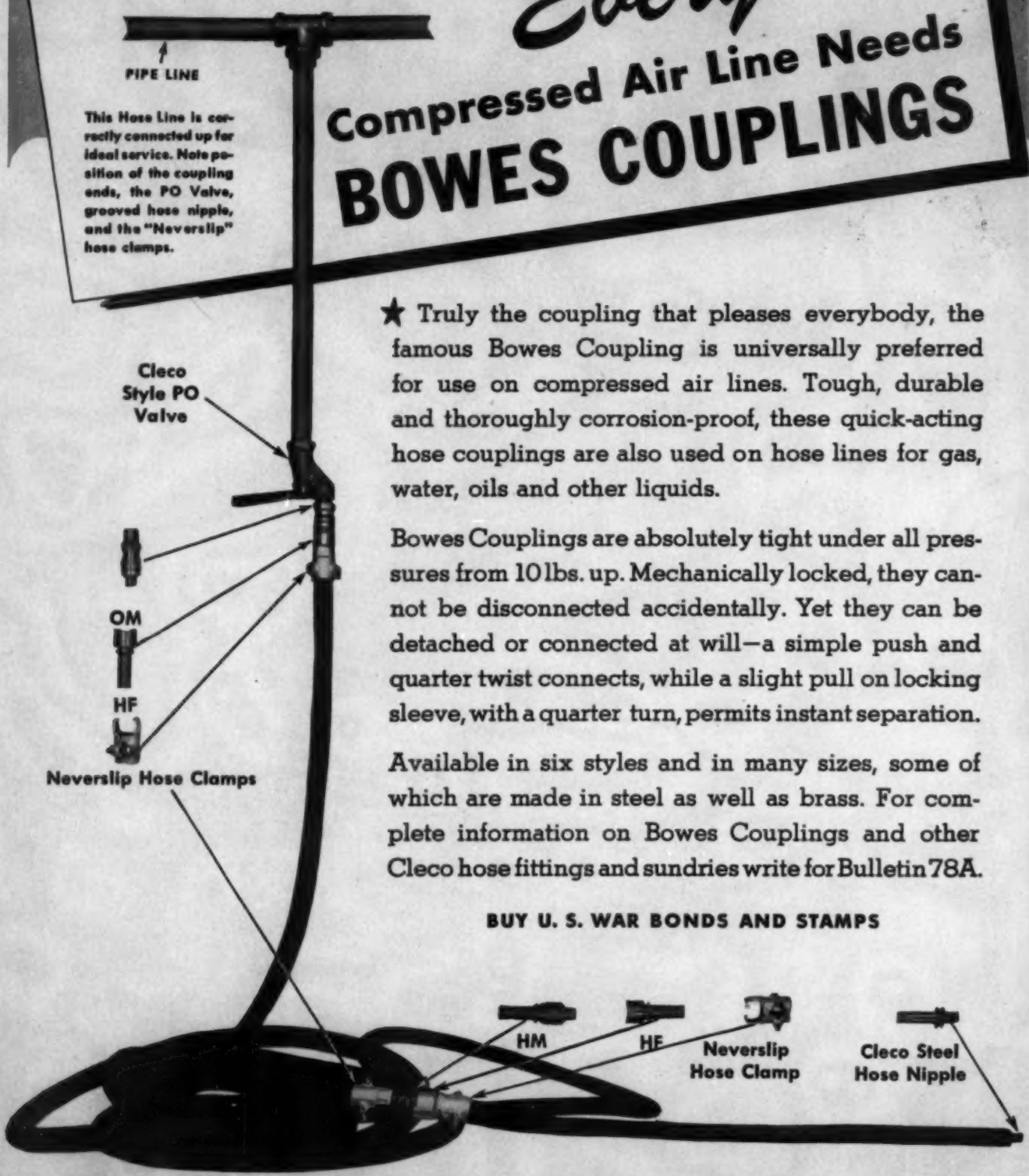
Very truly yours,
E. C. ATKINS AND COMPANY

E. C. Atkins
President

WE RESERVE THE RIGHT TO CORRECT STENOGRAPHIC ERRORS OR OMISSIONS IN QUOTATIONS OR OTHER MATTER. ALL AGREEMENTS SUBJECT TO DELAYS RESULTING FROM UNAVOIDABLE CAUSES

and FIRST IN THE PURSUITS OF PEACE

Every Compressed Air Line Needs BOWES COUPLINGS


PIPE LINE
This Hose Line is correctly connected up for ideal service. Note position of the coupling ends, the PO Valve, grooved hose nipple, and the "Neverslip" hose clamps.
Cleco Style PO Valve
OM
HF
Neverslip Hose Clamps
HM
HF
Neverslip Hose Clamp
Cleco Steel Hose Nipple

★ Truly the coupling that pleases everybody, the famous Bowes Coupling is universally preferred for use on compressed air lines. Tough, durable and thoroughly corrosion-proof, these quick-acting hose couplings are also used on hose lines for gas, water, oils and other liquids.

Bowes Couplings are absolutely tight under all pressures from 10 lbs. up. Mechanically locked, they cannot be disconnected accidentally. Yet they can be detached or connected at will—a simple push and quarter twist connects, while a slight pull on locking sleeve, with a quarter turn, permits instant separation.

Available in six styles and in many sizes, some of which are made in steel as well as brass. For complete information on Bowes Couplings and other Cleco hose fittings and sundries write for Bulletin 78A.

BUY U. S. WAR BONDS AND STAMPS

THE CLEVELAND PNEUMATIC TOOL CO.

3781 EAST 77th ST. *Branch Offices in All Principal Cities* CLEVELAND, OHIO

★

TOOK THEIR WORST . . . BACK AGAIN!

DIAMOND G CONTROLLED TENSION HOLDS TIGHT IN ANY FIGHT!

Blasted by bullets. . .torn by shells, but they still come back and are soon ready for more. That's the story of American planes today. And Diamond G is proud of the part their washers are playing in this grueling, strenuous task of our war birds. For in every leading type of American plane the "Controlled Tension" built into Diamond G Lockwashers is holding parts together under shocks and strains never before encountered. Plane manufacturers know when it's a Diamond G it holds!

But high quality in Diamond G washers is not the only way we are helping to speed victory—there's speedy deliveries, too. Quick service is our specialty and our goal for every order.

Whatever your needs Diamond G has the answer. Whether you need special washers for exceptionally fine instruments or big bulldog-grip washers for battleships Diamond G can supply you. From No. 0(1/16" IDO) to 2" lock washer. . .steel, steel-plated, bronze or stainless steel. We manufacture a complete line of lock washers including AN 935 series as well as aviation flat washers AN 960, AN 940, AN 945 and AN 970. Write for information and prices.

GEORGE K. GARRETT COMPANY
D & Tioga Sts., Philadelphia

DIAMOND G LOCKWASHERS

Another Industry Switches to

WELDMENTS

fabricated by

MAHON

THIS

WELDED STEEL BASE for LOCOMOTIVE CRANES

is designed and built to take the shocks and strain of heavy duty service. It must carry not only the weight of the crane—but the extra load of continuous lifts and hauls.

More and more industri are utilizing Mahon facilities the fabricating of *welded ste plate* parts and fittings. Most cent to recognize the greater adva tages of welded steel plate constructi is a leading manufacturer of locomoti cranes. The bases which support the cranes now are built by Mahon. It is hea duty work like this that demonstrates t superiority of *welded steel* over other co struction—and the fact that Mahon has t ability and equipment to produce it.

Inquiries are invited. Our design engineers will analy your product and advise you if welded steel plate co struction can be advantageously utilized in its manufact

THE R. C. MAHON COMPANY

DETROIT — CHICAGO

Fabricators of Machine Bases and Frames and Many Other Welded Steel Plate Products

Rivet handling system operated by physically handicapped workers pays dividends. *Page 84*

EDITORIAL STAFF

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Editor-in-Chief

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STEEL

The Magazine of Metalworking and Metalproducing

JULY 5, 1943

Volume 113 *Number 1*

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STEEL
July 5, 1943

INDEPENDENCE DAY, 1943: As this is written, the utterances of spokesmen for the Allied Nations seem to indicate that the zero hour for invasion is near. If the war chiefs are inclined to dramatize historical dates, they may time their assaults upon the enemy to accord with Independence Day (July 4 or 5), or Bastile Day (July 14).

But whether or not American citizens find themselves listening to invasion news on July 5, they may well schedule as part of their observation of Independence Day a careful rereading of the Declaration of Independence. It will be refreshing and instructive to review again the reasons why our forefathers decided that it was necessary to break with the mother country.

As one reads the bill of complaints against the king, one is impressed with the fact that the colonists were fed up with two features of the royal administration. First, the citizens in the new world were ruled by personal edict instead of by fair laws. Secondly, the crown had "erected a multitude of new offices and sent hither swarms of officers to harass our people and eat out their substance."

In 1776, these and other unfair practices were imposed upon the colonists by a king motivated by arrogance, greed and lack of consideration for his remote subjects. Repetition of the offenses over a long period prompted our forefathers to rebel and to support their declaration of independence with a pledge to each other of "our lives, our fortunes and our sacred honor."

In 1943 in the homeland of America the people are restive under a mismanagement of internal affairs which in its effect upon the citizens closely parallels some of the injustices perpetrated by the king in 1776. We have rule by individual edict rather than by law. We have an overgrown bureaucracy, far outstripping anything which the crown imposed upon the colonists 167 years ago. The only difference is that the king's actions were deliberate, whereas the injustices under our present administration are largely accidental rather than intentional.

On this July 5, 1943, the people would welcome a second "declaration of independence"—a hope or promise that our nation can gradually free itself from the grip of arbitrary directives and from the heavy, demoralizing hand of power-crazy bureaucracy.

Recent straws in the wind point to a deliverance from our slavery to these masters. The temper of Congress and the restiveness of the public indicate that the nation is aroused. We hope that the administration, which is doing such a good job on the war front, will read the signs of the times correctly and will revamp the administration of internal affairs in time to avoid a disastrous explosion.

The framework of our democracy is sound. Let us not overload it with abuses of our own making.

• • •

ALLOCATING WAR WORK: A year ago one heard numerous complaints about the inability of small companies to obtain war contracts. Today criticism on this score is rare.

One reason for this is that prime contractors on their own initiative have distributed more work to more subcontractors. Another reason is that the Smaller War Plants Corp., headed by Brig. Gen. Robert W. Johnson, has been able to assist small companies to obtain orders.

To June 15, through the direct efforts of SWPC, prime contracts aggregating $750,000,000 were awarded to 4100 companies (p. 79) and subcontracts amounting to $251,000,000 were awarded to an additional 4200 firms. Also the corporation itself assumed four prime contracts totaling $11,010,847 and subcontracted the work to small manufacturers.

Here and there may be found a shop which desires war work but has not been able to get it, but in the main private subcontracting—coupled with the more than a billion dollars of work provided through SWPC—has eased the plight of many plants having modest or limited facilities.

• • •

CANADA IN 6TH PLACE? Canada's iron and steel industry has grown rapidly during the war. By the end of 1943, the Dominion will be producing steel ingots at a rate of more than 3,000,000 tons annually. This will mean that steelmaking

(OVER)

capacity has doubled since the war began. The capacity of steel foundries has more than doubled. In a few weeks pig iron production will be at the rate of 2,500,000 tons annually, which is four times the output at the beginning of the war. Canada now has the two largest blast furnaces in the British Empire.

These wartime achievements greatly enhance the Dominion's position in iron and steel. Among the United Nations, Canada as a steel producer (p. 94) is exceeded only by the United States, Russia and Great Britain.

At the outbreak of the war the nations whose steel ingot output was 3,000,000 tons or more annually were the United States, Germany, Russia, Great Britain, France, Japan and Belgium. No one can predict the fate of the steel capacities in enemy hands but it is possible that Canada, which stood twelfth among the nations in 1929, may emerge from the war in sixth or seventh place.

• • •

PROLONGS FATIGUE LIFE: Some authorities believe that a number of the refinements developed in the finishing of aircraft engine parts during the war will become common practice in the manufacture of certain parts for automobiles, refrigerators and other products after the war.

One development which is attracting considerable attention is the practice of shotblasting or shotpeening the machined surfaces of connecting rods, crankshafts, gears, etc. There seems to be general agreement that this treatment (p. 102) increases the fatigue life of the parts to a considerable extent. Recent investigations indicate that the process also affords worthwhile savings in time, floor space, abrasives, labor and overhead.

Enough experience has been gained to prove that shotblasting has significant possibilities. It remains for the specialists engaged in this work to learn more about the effects of size of shot, velocity of shot, time of exposure and other factors. In the meantime we should not forget that the pioneering research on the subject of fatigue conducted by various investigators during the past few decades laid the groundwork for the current developments.

• • •

MEET THIS CHALLENGE: It is too bad that WPB's vitally necessary "Steel for Victory" drive had to be launched under such discouraging circumstances. At the time Chairman Donald M. Nelson and Vice Chairmen C. E. Wilson and H. G. Batcheller were exhorting Pittsburgh steelmakers to increase steel output (p. 64), 100,000 tons of steel a week were being lost as a result of the coal strike mess. Also lingering in the minds of all concerned was the sobering fact that the recent two days of rioting in Detroit (p. 82) cost the war production program more than a million man-hours.

Notwithstanding these obstacles, steel producers, fabricators and consumers can be counted upon to push Mr. Nelson's three-part program aggressively. It consists of increasing output from existing facilities, a share-the-steel campaign in which fabricators and consumers will co-operate to aid in a better distribution of steel, and an effort to get new steelmaking facilities into production ahead of schedule.

There is opportunity for great achievement in each of these three objectives. We believe steelmen will respond to this challenge, irrespective of the unintentional sabotage resulting from Washington's failure in labor relations.

• • •

NEED MORE FLEXIBILITY: American industry should be vitally interested in Senate bill No. 1160, introduced by Sen. James G. Scrugham of Nevada, which if enacted would provide for the stockpiling of strategic minerals at government expense immediately after the end of the war.

Practically every informed person will agree that this nation should be fortified with reasonable reserves of strategic minerals against future emergencies. However, it is doubtful whether the bill proposed by Senator Scrugham (p. 77) provides the best method of solving this problem.

For one thing, the bill contains specific restrictions as to prices, sources of supplies, control, etc. which do not take into account conditions which may exist in the near future. The bill should be modified to afford sufficient flexibility to enable the administrators of the stockpile to cope with the technological, economic and other factors which will prevail when the minerals are being stored.

The important problem of stockpiling warrants more attention as to policy and method than has been devoted to it to date.

E. L. Shaner

EDITOR-IN-CHIEF

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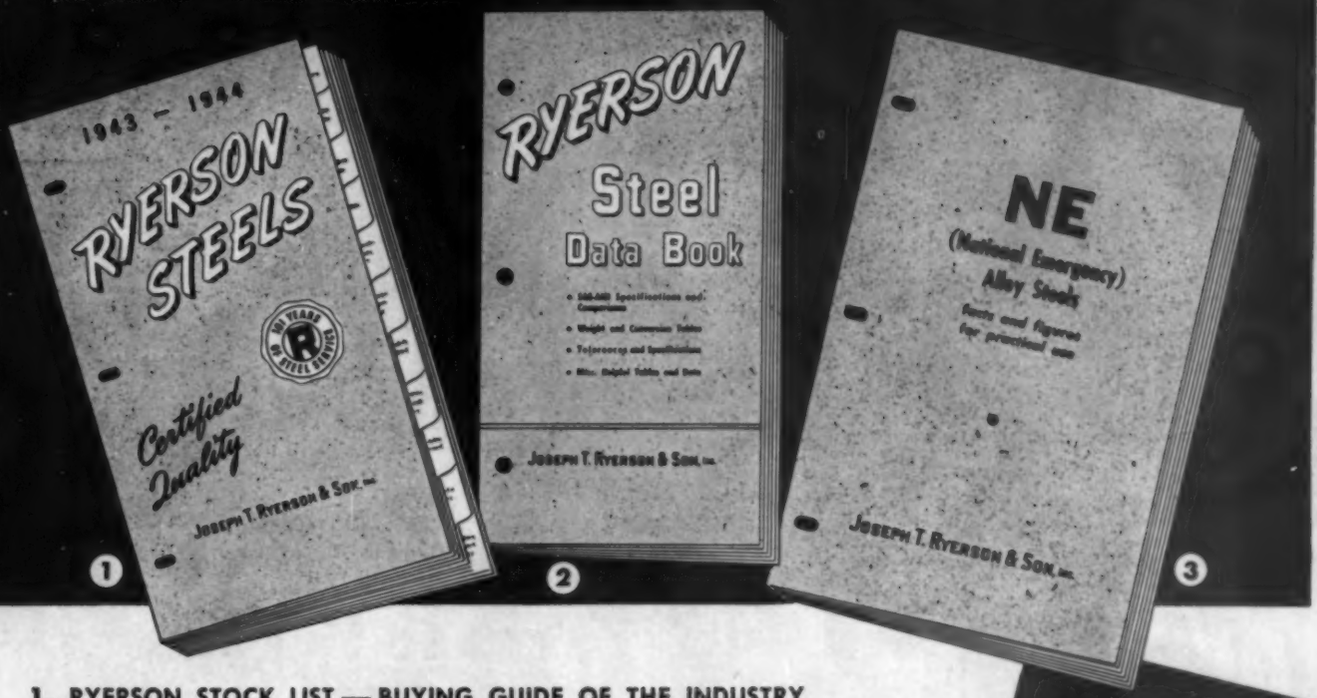

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Supply To Be Adequate for Food Canning

Production for 1943 limited. Eighteen of 28 electrolytic lines completed, but currently available capacity is being operated at only 35 to 40 per cent

By B. K. PRICE
Associate Editor, STEEL

NEW YORK

WHATEVER decline may take place in the vegetable pack this summer, it will not be due to lack of tin plate. It will be due primarily to lighter crops and manpower shortage.

A backward spring, heavy floods in the Midwest, and certain other early developments indicate lighter harvest than a year ago. However, many believe it is still too early to appraise accurately the summer's yield, and that highly favorable conditions may develop which will bring the pack up to almost as heavy as last year.

More concern is expressed over shortage of labor—shortage of harvesters in the field and shortage of men in the canning factories. Already this scarcity has manifested itself in various areas, notably on the East and West coasts.

Price cutbacks, and the attendant problem of subsidies, also may prove to be a factor, if not in the canning of vegetables this summer, very possibly in certain other lines of food products, particularly meats.

But as for tin plate there will be enough for the canning of major vegetable crops and all other highly rated foods. Tin plate production will not be anywhere near capacity, due to various government limitations. But the restrictions will fall heavily on nonfood containers and on certain lines of foods and beverages themselves, where substitutions can be made.

Actual tin plate capacity now is rated around 4,300,000 net tons annually, with cold-reduced at 3,800,000 tons and hot-rolled at 500,000 tons. Production for 1943 is limited to 2,600,000 tons, or approximately 60 per cent. This will be enough, it is claimed, to meet food requirements, a variety of ordnance needs, and a fairly substantial export program.

Fourth Quarter Output To Increase

During the early part of the year, output was lower than at present, the beginning of the summer season. Production for sale figures of the American Iron and Steel Institute for the first four months totaled 655,951 tons of cold-reduced, or 52.3 per cent of rated capacity, and 6955 tons of hot-rolled, or 4.2 per cent. This latter figure reflects particularly the marked shrinkage in demand over recent years.

Production of tin plate in the final quarter of this year will show a substantial gain over the corresponding period of last year. A basic operation will be set up for the quarter which amounts to a guarantee by the government, it is said, of an operating rate of approximately 50 per cent. The fourth quarter normally is the least active period of the year. However, last year, due to various government restrictions, the down swing was more pronounced than usual, with the rate of tin plate production reaching the lowest level in years.

Many units were forced to close down entirely for several weeks. This proved particularly tragic for, with heavy demands for labor from other industries tin plate producers lost large numbers of men. In anticipation of such difficulty, a plan was conceived last summer to sustain a modest rate of tin plate operations through the lean fourth quarter period, but it developed too slowly to be put into use last year.

Electrolytic tin plate will not be used heavily in canning of food this year. Of a projected capacity of 2,000,000 net tons of electrolytic tin plate comprising 28 lines, 18 are now available, although not all are in full operation. Hence, it is estimated that actual production is not over 35 to 40 per cent of currently available capacity.

Some of these lines have been brought in recently, but to have been really ef-

fective in meeting this year's food requirements, they should have been operating in February, March and April.

However, it appears as if the stage were set for the use of a substantial quantity of electrolytic tin plate for the canning of food next year. Practically all of the projected program of 2,000,000 tons will be available by the end of this year if not by early in the last quarter. The fourth quarter should see an increased production of electrolytic tin plate—ends and certain other uses which can be produced in anticipation of next year's needs.

In some respects inability to get the electrolytic program into full completion by this time is just as well. An effort has been made to compress a program that normally would require ten years into a much, much shorter time and there is still testing to be done for certain applications. However, desirability of electrolytic plate for many purposes has been fully demonstrated, with the further development of its potentialities only a matter of time.

There were few electrolytic installations until 1941 and from that time on development has been particularly intensive, with marked saving in tin a particular incentive in these emergency times. It requires a slightly smoother surfacing of black plate, but a lighter weight of tin coating more evenly distributed can be accomplished than by the older hot dipping method.

Tin conservation is still highly important, although the supply situation is easier. When this country entered the war much concern was expressed over the possibility of a shortage of tin. This concern became acute shortly after the fall of Singapore and the East Indies generally to the Japanese. Fortunately the shortage did not develop as seriously as expected. Tin plate manufacturers, following outbreak of the European war, had begun accumulating stocks. With the serious turn of events in the Far East, prompt restrictions were put into effect on consumption and Bolivian tin operations were developed rapidly and in the spring of 1942, the Metals Reserve Co.'s smelter at Langhorne, Tex., came into operation. Today, as a result of all of this, tin is regarded as less critical than copper and zinc, and while the amount of tin reserves on hand is not publicly available, it may be that stocks are actually heavier than when this country entered the war.

At present much experimenting is going on with respect to heavier coated electrolytic plate. Up to this time the half-pound coating has been the rule. However, recently several producers have filed prices with Washington on three-quarter pound coating, and it is believed that as time goes on, especially after the present emergency is over, this coating may become standard, thus widening the scope of electrolytic plate applications.

Electrolytic Lines Much Faster

Since the earlier installations of electrolytic tin plate lines, much greater speed in production has been developed. Recent units have been designed to handle 36-inch coiled strips at better than 600 feet per minute, or about twice the speed of the earlier units, although actual production speeds have been somewhat less. Being highly mechanized, the electrolytic lines require less manpower, an important consideration in the present emergency, which should be felt in increasing degree as the program moves to completion this fall.

At present electrolytic tin plate is specified largely for ends, although for some vegetables, corn, for instance, it is used for bodies—at least to the extent available. Still a relatively new product, electrolytic tin plate is being used conservatively by the armed forces for certain food packs, especially where the food is to be shipped to various climates and handled under many conditions.

Bonderized plate has not been used to any great extent to date in the canning of foods, although greater application is expected next year. Bonderized capacity is estimated at around 400,000 tons annually, with production at the rate of approximately 130,000 tons. Bonderized plate is being used for ends of cans for peas and corn and is recommended for certain meat cans, such as cans for meat spreads, sausage, luncheon meats, and so forth. It also is used for ends for cans for dry or powdered milk, among other special applications.

Terne plate today probably does not exceed 5 per cent of coated can production, and much of this is going into oil cans for export.

A number of can sizes have been eliminated for specific products and as for the 1943 food pack there is a further heavy increase in the use of No. 10 cans (one gallon net), at the expense of the No. 2 cans and other small sizes usually seen on retailers' shelves. Last year, it is said, canmakers increased production of No. 10 cans about 65 per cent over normal, with the possibility, provided machinery is available, of another 25 per cent increase this year. Although many types of containers requiring tin plate have been eliminated for the duration, the war nevertheless has called for vast quantities of specialized steel tin plate containers, for such as first aid kits, portable blood banks, explosives and other powders, and so forth.

Dehydration and frozen food processes have lifted the burden on tin plate to some extent, as have also glass, paper and fiber substitutes in many packaging applications. However, once the emergency is over tin plate will again be called upon to meet past needs in most cases, and probably for a large number of new uses.

Producers Believe Restrictions on Tin Can Be Eased

By R. L. HARTFORD
Associate Editor, STEEL

PITTSBURGH

WHAT will happen in tin plate markets between now and the end of the war depends on the duration of hostilities. Supplies of tin are the key to the situation and how long present supplies must last hinges on the length of the war. Naturally use of current tin stocks must be predicated on the best possible guess as to the answer of that question.

The guesser is the War Production Board. Many people within the industry believe WPB has guessed wrongly and is unduly strict regarding the volume of tin meted out to the tin plate producers. Looking longingly at the stocks of tin now resting in their mills, a good many producers cannot understand why they must be so limited in their production. Looking at the glistening new electrolytic tin plate lines, they wonder how soon WPB will allow release of sufficient tonnage to make the lines operate at a figure which will permit the mills to get back their costs.

On the face of it, it is difficult to understand why the electrolytic tin plate program was made so large if it is to be permitted to operate only at partial capacity. Under present circumstances, 50 per cent operation of all the electrolytic units which are completed or nearly completed would be a virtual impossibility.

The third quarter of this year, as in almost every previous year, will be the high point in production. Total tonnage produced during that period will probably not exceed 750,000 tons.

Chief stumbling block in the whole electrolytic tin plate program is the fact

that the Army requires dipped plate on all its overseas material, and lend-lease has this same requirement to a considerable degree. This means that such heavy tonnage items as the Army field ration cans, oil cans and the like are barred from the electrolytic lines, and only domestic food cans are left. In some instances, these cans require a heavier coverage than the half pound coating which is standard on electrolytic plate, and either a heavy lacquered electrolytic or dipped plate must be used. Lacquering facilities have always been a bottleneck in the canning industry, and the situation has not been remedied, so dipped plate too often becomes the answer.

A new development which may hold the key to this problem is the introduction of a medium weight electrolytic plate. This new product carries 50 per cent more tin than the regular electrolytic, and about half the weight of dipped plate. Laboratory tests show the new product is satisfactory for many of the borderline cans, but as in all tin plate applications, the efficacy of the plate won't be fully known until it has been in service for many months.

These products will unquestionably have heavy postwar applications. In the first place, they will have an advantage over dipped plate pricewise, inasmuch as there is a 50-cent differential on standard electrolytic and a 35-cent differential on the medium weight. This in itself will assure these products of a place in the market once restrictions on the use of plate are released. There is also the possibility that the whole cost structure may be revised because of economies in the manufacture of the electrolytic product, even with extra heavy coatings, which are available but prohibited under wartime restrictions.

Mills Hampered By Conversions

To some extent, the volume of plate produced will be dependent on the volume of steel available for tinning. This is an important factor, although not so critical as the amount of tin which WPB will permit the mills to use. The steel directive for cold-rolled strip for tinning has been generous in comparison with the volume of tin released for this purpose. Most of the continuous mills have been hampered to some extent by conversion to plate production. However, a fair volume of hot-rolled strip has been produced at odd moments, sandwiched between plate rollings, and this is gradually being processed by the cold mills and being stocked in the tin mills preparatory to tinning. The lag from initial operation to finished product is not large, but it is enough to provide a comfortable working margin.

Another factor which has been of considerable importance in the market is the tonnage of idle and excessive inventories, plus the tonnage of plate frozen in the hands of consumers not permitted to use it. This tonnage has gradually been moving into consumption, steered by Steel Recovery Corp. The SRC now states that the end is in sight, and that the balance of this tonnage will all be absorbed by the canners by the end of the 1943 canning season. The tonnage involved has been considerable and has been the only reason why many products have not disappeared from the market, when this stock is gone, unless there is an easing of WPB restrictions, canners of these "fringe" products now operating under M-81 (relaxed) will be forced out.

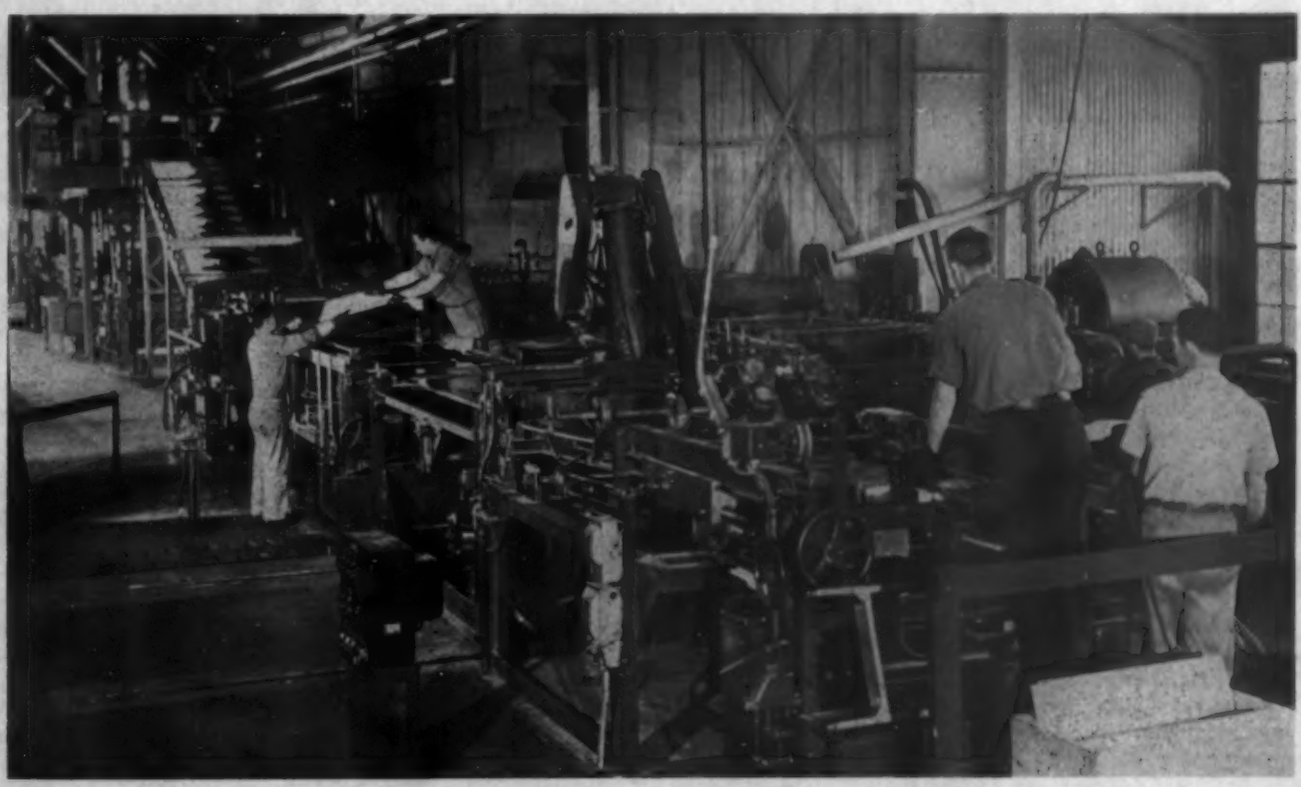
New electrolytic tin plate line at the Gary, Ind., sheet and tin mill of Carnegie-Illinois Steel Corp., United States Steel Corp. subsidiary

Expedites Use of Steel in Cartridge Production

To expedite substitution of steel for brass in production of military cartridges, a gift has been made to the government of a patent covering the processing of ammunition parts made from "non-directional" steel, it was announced last week by John M. Olin, vice president, Western Cartridge Co., East Alton, Ill.

Western Cartridge Co. is a leading producer of copper alloys, and conducted research in steel as insurance against possible shortage of copper.

The company's action makes available to all ordnance plants and other manufacturers, without cost, a process designed to speed-up the changeover from brass to steel in producing cartridge cases.



"Victory Campaign" Stymied by Imbroglio in Soft Coal Mines

Three-point program advanced by War Production Board at Pittsburgh to increase output 2,000,000 tons during second half. New projects to be rushed to completion. Sharing plan inaugurated.

BEHIND the 8-ball was last week's effort by the War Production Board, steel mill operators and the United Steelworkers of America to increase steel production by 2,000,000 tons during the second half of this year.

While WPB Chairman Donald M. Nelson and Vice Chairmen C. E. Wilson and H. G. Batcheller were exhorting steelmakers in Pittsburgh, center of one-fourth of the country's production capacity, to raise output, more than 100,000 tons of steel a week were being irretrievably lost as result of the stoppages in the coal mines.

During the week of the loudly-heralded "Steel for Victory" drive, ingot production dropped 6½ points, from 98½ to 92 per cent of capacity. Banked blast furnaces, lack of coke and coke oven gas will be reflected in steel operations for several weeks to come.

The difficulties posed by the bickerings between John L. Lewis, head of the coal miners' union, and the administration which had pampered him to a point where he could choke off a vital artery of the war production program gave added emphasis to the campaign to supply the steel needed for victory.

The program, as outlined by the War Production Board, consists of three parts:

(1). Increasing production from existing facilities by every possible means, through active co-operation of labor-management committees.

(2). A "Share the Steel" campaign to be conducted by the 12 WPB regional offices and the WPB Steel Division. This campaign will enlist the co-operation of fabricators with special reference to better distribution of third and fourth quarter production.

(3). A speedup of the expansion program to bring into operation ahead of schedule several electric furnaces and open hearths now partially completed.

Speaking at last week's "pep rally" at Pittsburgh, Mr. Batcheller declared that about 126,000 tons of steel were being forever lost during the week due to the coal strike. This amounted to more than enough to build 60 destroyers, he said, at a time when the Navy and Merchant Marine need ships as never before.

Mr. Batcheller said the changing aspects of the war are requiring more and more steel to do the job. When lone submarines ranged the East coast of the United States, 230-ton subchasers could combat them. Now that they hunt in packs, destroyer escort vessels are needed—and these ships require more than 1000 more tons of steel each.

"One day on a plate mill," said Mr. Batcheller, "will produce enough material to build a troopship and carry our fighters to the enemy." Similar short periods will produce sufficient steel for heavy warships and each hour a mill is down means that much tonnage lost forever, and that much longer that we must fight.

WPB Chairman Donald M. Nelson declared it is not yet time to think about peacetime projects. Good news from the battlefronts is tending to start industrial thinking toward postwar activity, and relax on concentration of the production of war goods. However, he said, future gigantic battles will consume unheard of quantities of materials. Steel, being the backbone of the war effort, will be called upon for more tonnage than even the present record-breaking output.

Appealing to the workers, Mr. Nelson said: "Steel must not be allowed to become a bottleneck. To prevent this from happening, new furnaces will be opened up to increase output. Fabricators of steel will be asked to share their steel supplies with one another.

"And above all, workers and managers of the steel industry have agreed to co-operate in finding ways to get more production from existing equipment."

Co-operation of more than 2000 of the larger manufacturing consumers of steel is being enlisted in the "Share the Steel" campaign. The WPB Steel Division, working through its 12 regional offices, will check the inventories of these consumers to determine how much, if any, of current stocks could be used to eliminate orders now on the books of producers for the third and fourth quarters. The Steel Division will contact consumers to squeeze out as much "water" as possible from the stated requirements of the claimant agencies.

Whatever good comes of the "Steel for Victory" campaign, however, appears likely to be neutralized by the muddle in the coal mining situation.

Coal miners worked or refused to work apparently as fancy directed. Blast furnaces were banked in several districts. Further curtailments during the current week appeared probable.

By-product coke ovens had an average of slightly more than a month's supply, although individual operators

CARL E. NEWTON

Appointed director of coal mine operations for the federal government, Mr. Newton is president of the Chesapeake & Ohio railroad

PASS DIVIDEND

"Because of uncertainties connected with the still unsettled question of miners' wages and working conditions and the possible consequences of continued government control and operation of the company's mines, the board of directors of Pittsburgh Coal Co., at its meeting today, found it impossible to take action on the declaration of a dividend on the company's preferred stock."

AUGUSTUS K. OLIVER, chairman,

Pittsburgh Coal Co.,

In statement to stockholders

were forced to close because of shortages.

As of June 1, steel plants had an average of 38 days supply, although here again certain plants were pinched by shortages.

Political bickering over the coal mine issue, including the President's veto of the Smith-Connally bill, the subsequent over-riding of the veto by Congress, various and contradictory statements by Secretary of Interior Ickes, the War Labor Board and the President, have created an imbroglio that defies disentanglement.

The government apparently will continue to operate the mines for an indefinite period, although Secretary Ickes last week denied that the government intended to nationalize the mines.

At the same time, Mr. Ickes appointed Carl E. Newton, president, Chesapeake & Ohio railroad, as director of mine operations for the federal government until labor peace has been restored in the coal pits.

Present, Past and Pending

■ BOMBER PRODUCTION SHARPLY INCREASED

LOS ANGELES—Harry Woodhead, president, Consolidated Vultee Aircraft Corp., told a meeting of company managers last week production of four-engined Liberator bombers increased 330 per cent during the first half of 1943 compared with the like period last year.

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■ NEW MAGNESIUM PLANT TO START SOON

NEW YORK—Revere Copper & Brass Inc. within the next few months at its division in Maryland will start operations of a new magnesium sheet and strip mill, the largest of its kind in the country. The plant is being financed by Defense Plant Corp.

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■ MACHINE TOOL DEMAND TO BE SMALLER

CLEVELAND—Machine tool demand for the remainder of the war will be larger than in the pre-war years but substantially smaller than in the last few years, the National Machine Tool Builders Association predicts in an analysis of the outlook for the industry.

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■ MAY DEVIATE FROM FULL TRAIN CREW LAW

SAN FRANCISCO—The California Railroad Commission has issued an interim order authorizing railroads operating in the state to deviate from compliance with the full train crew law when deemed necessary due to the unavailablity of the required number of brakemen.

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■ LARGE EQUIPMENT BACKLOG IS HELD

NEW YORK—Backlog of unfilled orders amounting to nearly two billion dollars is on the books of railroad equipment builders. About three-fourths represent direct war work, including tanks, shells, gun carriages, castings, fuses and naval vessels.

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■ SHARP INCREASE IN PLANE RADIATORS REPORTED

NEW HAVEN, CONN.—Increase of 700 per cent in less than two months in production of cartridge core radiators for army fighting planes announced by Winchester Repeating Arms Co. Each radiator is composed of several thousand copper tubes encased in a brass shell.

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■ EMPLOYMENT OF THOSE OVER 45 INCREASING

WASHINGTON—More than a third of the total number of persons employed in May were 45 years of age or older, Manpower Commissioner McNutt reported last week. Steady rise in employment of older workers, he said, indicates employers are losing their prejudice against this group.

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■ USING LESS STEEL FOR ARTILLERY SHELLS

CHICAGO—American manufacturers are using less steel to produce greater number of artillery shells under improved methods of manufacture, according to the Pullman-Standard Car Mfg. Co., which the company has made available to industry. The process saved 28,000 tons of steel in the Pullman shell plants alone up to the end of 1942.

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■ LOCKHEED TO SPEED UP P-38 PRODUCTION

BURBANK, CALIF.—During the next 60 days production of Lockheed Lightnings (P-38) will be doubled at the plant of the Lockheed Aircraft Corp., according to Richard Von Hake, vice president in charge of manufacturing. A new assembly line, now in operation, will cut manhours per plane by 40 per cent.

Launch Program To Obtain Idle Supplies

CHICAGO

Two officials of the WPB Steel Division, Charles Holcomb and H. M. Evans, have been assigned to ferret out idle steel supplies reported to be in the hands of large manufacturers in the Chicago area.

According to WPB announcement, the two Washington representatives will undertake the mission in connection with the board's nation-wide drive for an extra 2,000,000 tons of steel in the last half year.

Lake Ore Shipping Still Lags Behind Year Ago

Despite the fact lake ore fleet trip capacity during June was over 100,000 gross tons greater than a year ago, shipments during the month of 11,864,401 tons compared unfavorably with the 12,625,102 shipped in the like 1942 period.

For the season to date ore shipments are 9,200,000 tons behind the comparable 1942 period, totaling 24,793,890 against 33,952,166.

Subcontracting Plays Major Role, Says GM President

Subcontracting has played a major role in the "miracle of production" which has confounded Axis prophets and upset Axis timetables, C. E. Wilson, president, General Motors Corp. declared last week.

Citing his own company as an example, Mr. Wilson disclosed General Motors is the prime contractor in a network of more than 68,000 supply lines extending from GM manufacturing divisions to the plants of other manufacturers in all parts of the country.

Seek To Ease Cereal Binder Pinch

Foundry operations not yet adversely affected but output curtailment in many war plants is threatened unless corn distribution jam is broken soon

FOUNDRY operations have not yet been adversely affected by the shortage of cereal binders. In most instances foundries have sufficient core and moldings and binder stock to sustain peak production for three to four weeks.

To date no concerted effort has been made to experiment with available substitutes for binders. These include the by-product of the sulphite paper process known as lignin, in liquid or powdered form; dextrine; synthetic resins; soybean meal and rosin base binders. Whether or not these substitutes will be available in sufficient quantity to meet the enormous demand has not yet been determined.

Most foundrymen are confident the price tie-up in the distribution of corn will be rectified in the near future.

To avert threatened curtailment in output of the many war industries dependent in varying degrees on corn derivatives, the War Food Administration is requisitioning corn stocks in 96 midwestern terminal elevators for allocation to distillers and wet and dry corn processors.

Corn Refineries Close

Inability to obtain corn has necessitated closing of the Pekin, Ill., plant of the Corn Products Refining Co.; the American-Maize-Products Co.'s plant at Roby, Ind. and the Clinton Co.'s plant at Clinton, Ia. Operations at a number of other corn refiners' plants have been sharply curtailed. The three plant shutdowns account for about one-third of the industry's total productive capacity.

Allocations of the requisitioned corn will be but a fraction of the supplies actually needed over the remainder of this year—estimated at 300,000,000 bushels annually. The Commodity Credit Corp. is said to hold 10,000,000 bushels of corn for transfer to industrial users, while private storage elevators are estimated to contain an additional 25,000,000.

Recent CCC decision to allocate corn from private stocks is believed to be a last minute effort to break the distribution jam. Solution to the problem of inducing farmers to move their estimated 950,000,000 bushels into industrial channels is hoped to be accomplished by WFA paying farmers applicable ceiling prices if they sell their product between July 1 and Aug. 10, and assuring them of supplementary payments if ceilings are increased later on or before Oct. 31.

Concurrently, WFA announced a one cent a bushel increase in the national average of wheat loan rates on the 1943 crop. The new rate is $1.23 a bushel.

WFA officials state "widespread rumors that corn ceilings will be raised" have contributed to the current problem by inducing farmers to hold their crops off the market.

Acute seriousness of the corn distribution situation is indicated in the following wire sent by Cyrus S. Kauffman, Food Distribution Administration, to corn processors and refiners:

"Imperative you continue your effort to fill orders for direct war needs. We particularly refer to any requirements needed by iron, steel, aluminum, magnesium, brass and bronze foundries as it is especially vital that no shutdowns occur in these industries. We further urge you to continue deliveries of starch and other refined corn products for war needs for manufacture of explosives, chemicals, textiles, paper products including V-Board, fiberglas, woven asbestos cloth and pharmaceuticals as previously outlined to you at our several meetings."

The requisition of corn stocks follows previous government actions designed to make corn available for processors and feeders. On May 5 the CCC called all of its loans on 1938, 1939, 1940 and 1941 corn—the corn to be redeemed or delivered to the CCC by July 1. On June 16 similar action was taken on 1942 corn, for redemption or delivery by July 15.

Stamm Is Named President Of Andrews Steel Co.

Charles H. Stamm, former vice president of the Andrews Steel Co., Newport, Ky., has been elected president succeeding Norman B. Schreiber who has resigned to accept chairmanship of the board of the Hardy-Burlingham Mining Co.

Frank V. Benton Jr., Newport, Ky., attorney, has been named secretary of the steel company and Newport Rolling Mill Co.

Herbert W. Boal is vice president and treasurer of the Andrews company in the new setup.

Jerome S. Greenberg has resigned as vice president and secretary.

Mr. Schreiber has disposed of a substantial portion of his stock holdings in the Andrews company to eastern interests.

The Andrews family sold its interest in the company to a Chicago and New York syndicate headed by Mr. Schreiber, several months ago.

Mr. Stamm has been engaged in the steel industry for nearly 40 years, including associations with the American Rolling Mill Co., Mansfield Sheet & Tin Plate Co. and Empire Steel Co.

BIG INCH PIPE COMPLETED: Lorain, O., mills of the National Tube Co. have shipped the last trainload of 24-inch seamless pipe for the 1272-mile pipeline from Texas to the East. Above are shown six of the workers who completed the production job in record time, standing before the last carload shipped

Maintenance of Quality Under War Conditions Discussed by ASTM

DEAN HARVEY, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., was elected president of the American Society for Testing Materials at the society's forty-sixth annual meeting in Pittsburgh, June 28 to July 1.

Mr. Harvey, who has been vice president of the society for the past two years, succeeds H. J. Ball of Lowell Textile Institute, Lowell, Mass.

John R. Townsend, material standards engineer, Bell Telephone Laboratories, New York, was elected vice president.

Executive committee members are: T. A. Boyd, General Motors Research Laboratories, Detroit; William H. Finkeldey, Singmaster & Breyer, New York; E. W. McMullen, director of research, Eagle-Picher Lead Co., Joplin, Mo.; E. O. Rhodes, technical director, tar and chemical division, Koppers Co., Pittsburgh; and Francis G. Tatnall, manager, testing equipment department, Baldwin-Southwark division, Baldwin Locomotive Works, Philadelphia.

The new officers were installed at the general meeting of the society, which also featured an address by Andrew H. Phelps, vice president in charge of purchases and traffic, Westinghouse Electric & Mfg. Co. Mr. Phelps discussed the problems of maintaining quality of manufacture under wartime conditions and praised the ASTM standards for their part in maintaining quality of American manufacture. Mr. Phelps cited many material shortages and the substitutions which have had to be made to meet them.

Frank B. Bell, district chief, Pittsburgh ordnance district, outlined the job which Army ordnance is doing and stressed the importance of ASTM specifications in the work on ordnance.

Walter Bonsack, chief metallurgist, National Smelting Co., Cleveland, was awarded the Charles B. Dudley medal in recognition of his paper on "Discussion of the Effect of Minor Alloying Elements on Aluminum Casting Alloys."

The eighteenth Edgar Marburg lecture was delivered by L. J. Markwardt, chief, Division of Timber Mechanics, Forest Products Laboratory. Mr. Markwardt's subject was "Wood as an Engineering Material". The speaker covered the application of wood both in its natural form and in various modified forms through the use of glues and synthetic resins.

The session on iron, steel and metallography featured a study on the measurements on permeability of both alternating and direct current on 28 centimeter steel test specimens. This paper was presented by J. P. Barton and G. W. Smith, Carnegie-Illinois Steel Corp. George F. Comstock, Titanium Alloy Mfg Co., presented a paper on, "The Strain Aging of Killed Low Carbon Steel, with Particular Reference to the Effect of Titanium." Structure and creep characteristics of cast carbon-molybdenum steel were discussed by H. E. Montgomery and John Urban, Lunkenheimer Co.

The use of chromium as a special plating agent for engineering applications and the control of the coat as to thickness and finish were discussed by T. G. Coyle, United Chromium Inc., in the session on electrodeposited coatings. Newly assembled data on the properties of plated lead coatings on steel were presented in the same session by Gustaf Soderberg, Udylite Corp.

TEXAS IRON

Progress in building the two Texas blast furnaces continues. The 245,000-ton (annual capacity) stack of the Sheffield Steel Corp. at Houston is slated to go in blast in September, while the 432,000-ton stack of the Lone Star Steel Co., Daingerfield, is to become active in October. Product of the Houston furnace will be used in the Sheffield open-hearth furnaces at Houston, the ingots to be rolled into finished products on the new Sheffield rolling mills. No decision has been reached as to where the pig iron to be produced at Daingerfield will be used. The steelworks project at Daingerfield has not yet been approved finally.

Metal Congress To Be Held In Chicago Oct. 18 to 22

Wartime Emergency Conference of the National Metal Congress will be held at the Palmer House, Chicago, Oct. 18 to 22 inclusive, the board of trustees of the American Society for Metals announced last week.

The entire congress and all activities associated with it will be devoted exclusively to the war effort and problems in the metal industry, and will have as its theme, "The Increased Production of War Products and Greater Conservation of Materials."

The American Welding Society, the Wire Association, the Iron and Steel Division, and the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers are cooperating with the American Society for Metals in the Congress.

Conferences will be held in 278 special sample rooms of the Palmer House. Manufacturers will be afforded an opportunity to display such portions of their products as will assist them in demonstrating how their equipment aids in increasing war production. There will be almost a total absence of heavy and large equipment in the displays, but adequate facilities will be available for showing light equipment, parts, products and processes.

Industrialists Cited for Conservation Performance

For outstanding performance in conserving critical materials costs, and manhours through redesign of war materiel, Col. H. M. Reedall, chief, War Department's Cleveland Ordnance district, at a dinner in Cleveland, last week presented ordnance citations to 14 Ohio and Pennsylvania industrialists.

This raises to 19 the number of citations received to date by Cleveland Ordnance district contractors. On the present procurement program savings brought about through redesign by these contractors is estimated at 15,000 tons of steel.

Following were awarded citations:

E. M. Tasker, Toledo Stamping & Mfg. Co.; Frank Marbach, Morrison Products Co., Cleveland; and Walter Kaufman, Lovell Mfg. Co., Erie, for special development work on machine gun tripods.

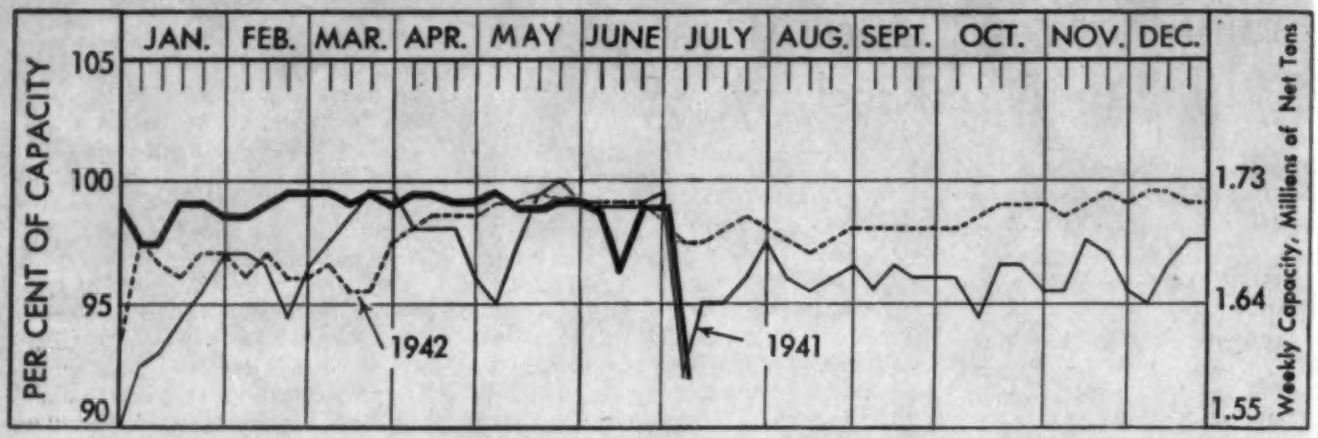
C. W. Hannon, Murray Ohio Co., Cleveland, and J. D. O'Brien, Inland Mfg. division, General Motors at Dayton, for substitution and redesign work on the new .30 caliber carbine.

R. L. Schonitzer, Reid Products Corp., Cleveland, for development on three components for heavy bombs.

G. W. Waters, Midwest Forge Co., Cleveland, for successfully applying the "gap mill" principle to gun barrel forging.

Homer Mueller and Harry Kranz, Cleveland Welding Co., Cleveland, for redesign work done on the "half-trac".

W. G. Kilpatrick and W. R. Harrison, Spun Steel Corp., Canton; E. H. Pinkus, Great Lakes Stamping and H. W. Kost, Prestole Devices Inc., Toledo; and Lester F. Kelch, Girard Mfg. Co., Girard, Pa., were awarded their citations for outstanding redesign work on fuses.



STEEL INGOT PRODUCTION BY MONTHS

Net Tons, 000 omitted

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1943	7,424	6,826	7,670	7,374	7,545	....	....	....	....	....	....	....
1942	7,112	6,512	7,392	7,122	7,382	7,022	7,148	7,233	7,067	7,584	7,184	7,303
1941	6,922	6,230	7,124	6,754	7,044	6,792	6,812	6,997	6,811	7,236	6,960	7,150
PIG IRON PRODUCTION												
1943	5,194	4,766	5,314	5,035	5,178	....	....	....	....	....	....	....
1942	4,983	4,500	5,055	4,896	5,073	4,935	5,051	5,009	4,937	5,236	5,083	5,201
1941	4,666	4,206	4,702	4,340	4,596	4,551	4,766	4,784	4,721	4,860	4,707	5,014

Republic Output

Maintained at average monthly rate of 100 per cent of capacity since Jan. 1, 1941

SINCE Jan. 1, 1941, steel plants of Republic Steel Corp., Cleveland, have operated at the average monthly rate of 100 per cent of capacity, according to T. M. Girdler, chairman, and R. J. Wysor, president.

In addition, each month's production during the period has exceeded that of the corresponding month in the previous year.

It is pointed out that with 20 per cent of Republic's 70,000 employes in military service, the company is employing nearly 7000 women, who are doing men's work in its steel and manufacturing plants. Women are running cranes; working at blast furnaces, open hearth furnaces and in sintering plants; operating machine tools; doing track maintenance work; working in metallurgical laboratories and shipping departments.

Discussing postwar planning, the Republic executives point out need for revision in tax and renegotiation legislation, which will enable business to accumulate sufficient surplus to see it through the trying postwar period.

Production of steel barrels and drums of heavy types in April amounted to 2,044,144 units, compared with 2,005,333 in March, according to the Bureau of the Census. Shipments in April were 2,019,781 units, in March 1,990,332.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week ended July 3	Change	Same week 1942	Same week 1941
Pittsburgh	76.5	—21.5	94	97.5
Chicago	98.5	+0.5	103	101.5
Eastern Pa.	93	None	96	92
Youngstown	94	—3	95	90
Wheeling	86	—0.5	83.5	87
Cleveland	90	—4	92	92.5
Buffalo	93	+2.5	90.5	75.5
Birmingham	95	—5	95	90
New England	93	—2	95	90
Cincinnati	92	—3	91	81.5
St. Louis	95	None	95.5	98
Detroit	92	None	91	83
Average	92	—6.5	*97.5	*92

* Computed on bases of steelmaking capacity as of those dates.

Magnesite Output Sets New High Mark in 1942

Production of crude magnesite, used in making magnesium metal and other products essential to the war program, established a new record in 1942, according to the Bureau of Mines. Output of magnesium compounds from magnesite, brucite, dolomite, sea water well brines and lake brines also increased in 1942. Dead-burned dolomite, used mainly as a steel furnace refractory, increased 15 per cent compared with 1941 and set a new high record in 1942 as the war program's demands for the item increased considerably.

Mine output of domestic crude magnesite reached the all-time high of 497,368 net tons, an increase of 33 per cent over 1941 production. Increased requirements of open-hearth furnaces for refractories was the chief factor.

Ingot Rate 92%

Sharp decline in openhearth operations reflects coal strike. Another stack lighted

PRODUCTION of open-hearth, bessemer and electric furnace ingots last week declined 6½ points to 92 per cent as a result of the coal strike, the lowest rate since the first week of July, 1941, also 92 per cent. Seven districts, led by Pittsburgh, showed declines, two made small gains and three were unchanged.

A year ago the rate was 97½ per cent; two years ago it was 92 per cent, both computed on the basis of capacities as of those dates.

Carnegie-Illinois Steel Corp. plans to blow in its enlarged No. 7 blast furnace at the Gary works between July 4 and 15.

The stack was blown out August 13, 1942, and has been rebuilt to a capacity of approximately 1500 tons per day, practically double its former output.

Bethlehem Steel Co. late last week blew in a new stack at its Bethlehem works. This is a Defense Plant Corp. furnace and is much similar to the one blown in at Bethlehem's Lackawanna plant recently. The stack was lighted with appropriate ceremonies.

Orders for 1939 steel boilers were received by manufacturers in May, compared with 380 in April, the Bureau of the Census announces. In May, 1942, orders totaled 1306 units. Total orders for five months this year numbered 4401.

Batcheller Named Vice Chairman Of WPB in Charge of Operations

APPOINTMENT of Hiland G. Batcheller as operations vice chairman of the War Production Board, and shift of Donald D. Davis from the position of operations vice chairman to the vice chairmanship formerly held by Ralph J. Cordiner, were announced last week by Charles E. Wilson, executive vice chairman, WPB.

Mr. Batcheller, who has been director of the Steel Division, will continue to direct the work of that division. Reporting to him in his new position as operations vice chairman will be all of the industry divisions of the War Production Board, together with the Conservation and Salvage Division, the Redistribution Division and the deputy vice chairman for Field Operations.

Reporting to Mr. Davis in his new vice chairmanship will be the Facilities Bureau, the Office of Progress Reports and the Office of Special Projects, the Office of Production Research and Development, the Statistics Division, the Procurement Policy Division, the Resources Protection Board and the Planning Committee.

Mr. Batcheller, president, Allegheny Ludlum Steel Corp., Pittsburgh, was appointed director of the Steel Division in September, 1942.

Mr. Davis, former president of General Mills, Inc., Minneapolis, was appointed director of the Program Coordination Division of the War Production Board in September, 1942, became director of the Program Bureau in November, and was appointed vice chairman for operations on March 3, 1943.

Howard H. Frank has been appointed deputy director of the Safety and Technical Equipment Division, WPB.

HILAND G. BATCHELLER

WPB Issues Rulings on Operations Under CMP

Records of maintenance, repair and operating supplies may be kept on the basis of supplies received, rather than amounts ordered in any quarter, War Production Board says. However, the use of one method for part of the supplies and another method for the balance is not permissible.

MRO Emergency Load directives to producers of steel castings, reserving a percentage of their expected monthly production to fill emergency orders have been established. Producers must reserve the percentage set in each case to fill authorized controlled material orders bearing the allotment symbol "MRO" but such space in monthly schedules is to be reserved for this purpose only up to the lead time date specified for steel castings in Schedule III of CMP regulation No. 1. After that date the reserved space is to be used to fill any authorized controlled material order placed in accordance with CMP regulations.

The directives establish the maximum percentage of monthly production of steel castings which may be reserved for MRO orders. If such orders are received after the reserved space has been filled, they are to be treated as any other authorized controlled material order.

Rail Anchors

Producers of rail anchors will continue to operate under production directives during the third quarter of 1943 and will obtain their production requirements for that quarter as they have in the past, the Steel Division of WPB says.

Beginning with the fourth quarter producers will operate under CMP regulation No. 8 and must obtain their controlled materials requirements, previously allotted to them, by submitting form CMP-4B to the Steel Division. In filing this application, controlled materials requirements should be indicated for the fourth quarter of 1943 and the first and second quarters of 1944.

The Steel Division will process these applications and allotments will be issued for the fourth quarter of 1943 and the first and second quarters of 1944. This will make it possible for producers of rail anchors to place advance orders for all requirements of controlled materials with any producers they elect and in sufficient time to secure acceptance of orders for delivery in the months required.

Copper Powder

Copper and copper-base alloy powder has been removed from the controlled materials list for the third quarter, the WPB Copper Division announces.

The action revokes that portion of CMPL-298, issued earlier this month, which stated that commencing July 1 no shipments of copper and copper-base alloy powder could be made except on controlled materials orders.

Producers, under the ruling, should continue to ship copper and copper base alloy powder on orders bearing preference ratings until Oct. 1.

It is stated that such powder will be placed on the controlled materials list for the fourth quarter, beginning Oct. 1.

Producers should continue to file form PD-59 for their raw materials.

Basis for Rejecting Rated Orders Clarified

Rated orders may be rejected, War Production Board says, for the following reasons: (1) Where a rated order calls for quantities which are less than the minimum which a person regularly sells; (2) where a person regularly sells only to certain types of trade purchasers, he may reject orders from other types of purchasers, but only if the merchandise can be obtained in the required quantity through regular trade channels; (3) where a manufacturer or wholesaler has an exclusive distributor, he may reject rated orders from other purchasers, provided the exclusive distributor is in a position to fill orders promptly. These provisions clarify exceptions to the rule in Priorities Regulation No. 1 that a vendor must sell his product to any person who presents him with a rated order.

Used Machine Tool Price Control Strengthened

Major revisions which strengthen and expand price control over second-hand machine tools have been announced by Office of Price Administration.

Among the more substantial changes are provisions which affect the rentals of used machine tools, tighten the control over auctioneer's sales and all rental agreements, and reduce the maximum prices for machine tools which are not rebuilt. A five per cent reduction is effected in the prices that can be charged for machine tools which are not rebuilt.

WINDOWS of WASHINGTON

Discouraging

DOMESTIC mica producers, and officers of the Mica Producers Association have charged before the Senate Truman committee that procurement policies of the Colonial Mica Corp., New York, designated by the Defense Supplies Corp. as the offical mica procurement agency, are discouraging mica production. Where in New Hampshire, for example, 38 mica mines were in production last year, today five are active.

Fair prices are not being paid, it was alleged, and the mica miners are not receiving help in getting needed labor.

A North Carolina mica grinder testified that when Colonial Mica Corp. sold him 64 tons of mica refuse it insisted the entire tonnage must be ground; it was testified that this causes great waste as the 64-ton lot contained 18 to 20 tons of usable mica. This situation, it was declared, threatens the radio and radar industries.

Pulling in Horns

At the time the House of Representatives decided not to appropriate money to continue the Office of War Information's domestic department, that unit was putting out some 50 to 60 releases per day. Since then the average has been between five and seven per day, the lowest volume in more than two years. This cut is due to a large extent to the new OWI policy of "pulling in its horns." It also is due in large measure to depressed morale; the boys in OWI now are alluding to themselves as "zombies."

House Chatter

From minutes of debate in the House of Representatives, June 21:

"Mr. Welch (of California)—'Is my colleague aware of the fact that the United States Steel Corp. limits the output of steel by the Columbia Steel Co., its subsidiary, whose plant is located at Pittsburg, Calif., to 10 per cent of the tin plate used by the canneries in the state of California?'

"Mr. Rolph (of California)—'I had no idea that it was limited to 10 per cent. That should be changed and corrected at once'."

This exchange occurred during a discussion by Mr. Rolph responding to the charge by Mr. Pace of Georgia that the empty cans purchased by a large cooperative canning plant "cost $36,000 more than all the farmers received for the products that went into the cans."

Mr. Rolph's speech, which covered all phases of the tin plate industry, particularly the elements of cost entering into production of tin plate and subsequent production of cans, defended the prices paid out for cans and cited the widespread employment which the canning industry provides to steelmaking, transportation and many other industries.

Synthetic Gas

Creation of a big new industry to manufacture synthetic gasoline from coal will occur after the war, in the opinion of Senator Joseph C. O'Mahoney of Wyoming. He has introduced a bill to authorize the Bureau of Mines to construct and operate pilot plants to produce such fuel from coal and shale, and he plans to hold hearings on it "very soon." Secretary of Interior Harold L. Ickes, he says, agrees with him that such a development on a large scale is inevitable. On the basis of what the Bureau of Mines has reported to him such synthetic gasoline can be produced at a cost of 12 to 16 cents a gallon as against 5 cents a gallon for gasoline refined from petroleum. Senator O'Mahoney says he has reason to believe that just as the cost of producing synthetic rubber is to be much lower than at first expected, so the cost of producing synthetic gasoline can be reduced.

FEW HANDOUTS

A few builders of machine tools and other durable equipment, realizing that the heat has been removed from most of such goods, have found other work to keep their plants and their labor forces busy. Many others who are confronted with dwindling demand for their regular products are waiting to see what will develop.

A high official of the War Production Board declares that a waiting attitude may prove a fatal one. He stresses the need for aggressive s e l l i n g. Equipment builders who have about completed their part of the tooling-up program may have to close down their plants if they do not obtain other work.

He warns such manufacturers to resort to the persistent, analytical, imaginative sales methods that are employed in normal times. Only by such tactics can these manufacturers be assured of continuing activity. "Hand-out" orders, he said, will be the exception rather than the rule.

Inquisitive Solons

Congressmen, with their salaries at $10,000, are always sure to inquire about salary increases during wartime when they question a witness in connection with contract renegotiation. They frequently indicate they think the price adjustment boards are too liberal in permitting high salaries to be included as costs. Specifically, it was shown that when the New York Shipbuilding Corp. began to figure in the shipbuilding program in a big way, its five top officials were increased from a total salary of $112,900 to a total of $277,000 yearly. The testimony showed that these men were receiving much lower salaries than executives in competing corporations, and it was the belief of the board of directors that the raises were necessary to make sure of holding them. It also was shown that this company got along with fewer top executives by having them work harder—so that the higher pay was warranted.

Have Fingers Crossed

While the Steel Division, WPB, believes enough iron ore will be brought down the lakes this season to fully meet requirements, in conjunction with the available supply of scrap, until the opening of the 1944 navigation season, this feeling is not fully shared in some other quarters in the War Production Board.

Too, several steel company production men who have visited here in the past week and who have checked all factors, including scrap they expect to produce in their plants and which they expect to obtain from customers and collectors, have their fingers crossed.

Seeks Fair Play

The Investors Fairplay League, 120 Fifth avenue, New York, ran full-page advertisements in Washington newspapers recently declaring that it is inaugurating a program of "co-operation with federal legislators and administrators." In the past ten years, it states, official Washington has been subjected to considerable pressure applied by groups whose interests are not identical with the interests of the investing public with the result that the viewpoint of America's 15,000,000 investors has been neglected — overlooked because it has never been presented to Washington in an organized, articulate manner. It plans to encourage—and to suggest—sound legislation to remedy existing shortcomings of both law and practice. The league has membership classifications calling for annual dues of $2 to $1000.

Inter-American Relations Setup Aims To Spur Economic Growth

Machinery for co-operation in developing resources augmented greatly since start of war. . . Accent currently on production for war but plans are shaped with view to erecting policy for postwar period

MACHINERY for inter-American co-operation in development of the hemisphere's economic resources has been augmented greatly since the start of the war in 1939 and will be available in large part for postwar industrial and other projects.

This is emphasized in the completion of the organization of the basic machinery of the Inter-American Development Commission and its 21 affiliated commissions in each American republic.

These commissions have been created since the outbreak of the war in Europe with the objective of providing channels of co-operation between government and private interests in the acceleration of hemisphere developments.

With the concentration of United States industry upon war work and the shipping shortage, however, many industrial development projects have been postponed for postwar execution. Today development of hemisphere resources largely is for immediate war needs, such as minerals, rubber, fibers and food.

Nevertheless, the development commissions have been busy preparing for the day when industry resumes its peacetime functions of producing goods for civilian consumption and for the elevation of the postwar living standards.

Last of the 21 commissions to be organized is the United States Commission of Inter-American Development, headed by Eric A. Johnston, president, Chamber of Commerce of the United States. This commission is working with the parent Inter-American Development Commission and through it with commissions in the other Americas.

Provide Indispensable Data

Before actual development projects reach the stage of financing and engineering plans, much preliminary work has to be done in way of studies and investigations. In recognition of this, development commissions have been initiating studies to provide indispensable data for use when it again will be possible to obtain ships, machinery and craftsmen for the building of new factories and the equipping of various industrial enterprises in countries dependent upon imported equipment for industrial development.

Illustrating this trend toward initiating immediate technical studies which will be useful for postwar planning is a large-scale investigation of the basic Mexican industries which is being carried out.

Moreover, the Inter-American Development Commission has sponsored important surveys of Brazil's vegetable oil resources, of fisheries resources in the Caribbean and Peruvian waters. It has initiated or aided in the assembling of many technicians to aid various hemisphere countries in development of mineral and agricultural resources.

Still the main work of the development commissions is regarded as in its infancy, considering the fact that only recently has its setup been completed, with 21 country commissions forming a hemisphere-wide organization tied together through the Inter-American Development Commission. This represents one of the most elaborate organizations yet created by the Americas toward the goal of closer co-operation in fostering industrial growth of inter-American trade.

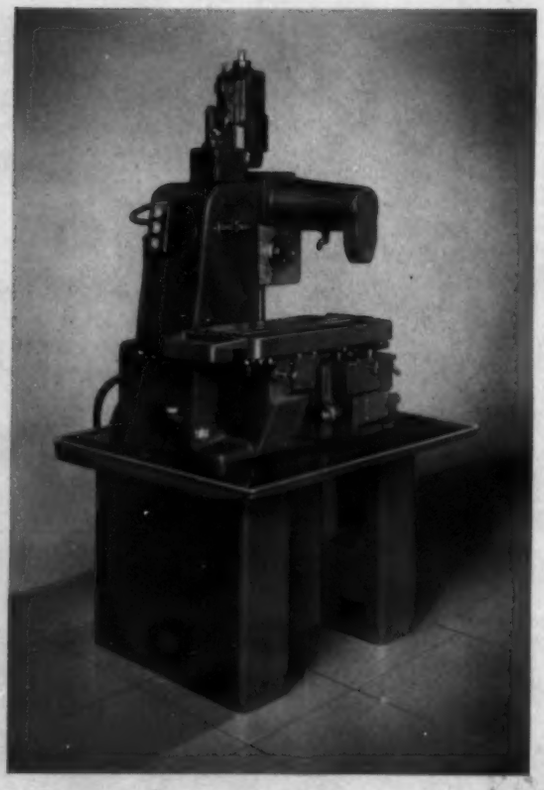
Development interests of these commissions run virtually the entire gamut of industry—from native handicrafts to giant hydroelectric projects. Native handicrafts are being encouraged in Peru with the guidance of handicraft specialists assigned by the Inter-American Development Commission. At the same time, the parent commission, working with various country commissions, has been active in procuring technical assistance for many projects typical of the machine age.

Five leading United States engineering societies have joined in the creation of a committee to provide advice on engineering problems to the Inter-American Development Commission. This committee is forming affiliations with Latin American engineering societies for the purpose of giving the commission access to outstanding engineering talent of the United States as well as of the other American Republics.

SHIP PARTS FOUNDRY: Anchors, propellers and other equipment weighing up to 70 tons are being produced in this new foundry just completed by Turner Construction Co., New York, at Birdsboro, Pa., for the Navy and leased to the Birdsboro Steel Foundry & Machine Co. The foundry uses the Randupson process, based on use of concrete molds. The process is claimed to eliminate much costly machining and finishing to size. Plant covers ten acres, required 7540 tons structural steel

A MIGHTY USEFUL MACHINE TO HAVE AROUND

CINCINNATI 0-8 MILLING MACHINE



Horizontal cuts only — vertical cuts only — a vertical and then a horizontal cut — two accurately spaced vertical cuts, and many more combinations are well within the range of the CINCINNATI 0-8 Plain Automatic Milling Machine equipped with automatic Rise and Fall Spindle Carrier. And changing from one automatic cutting cycle to another is a simple operation requiring less than one minute.

When it comes to milling a wide variety of small parts fast, accurately, in any quantity, your best bet is a CINCINNATI 0-8. You're going to be interested in the production possibilities of this versatile milling machine. It's a noteworthy contribution to the science of metal cutting by the engineers here at Milling Headquarters, and you'll find it a useful machine to have around.

Specifications catalog M-964-1 gives complete information on all features and why they will prove beneficial to you. A copy will be sent on request. Or look in Sweet's Catalog File for Mechanical Industries for brief description.

CINCINNATI

Navy E awarded March 6, 1942. Renewal star awarded August 29, 1942, along with Army-Navy E. The second star was awarded Feb. 23, 1943.

THE CINCINNATI

MILLING MACH BRO

AT ILLING MACHINE CO. CINCINNATI, OHIO, U. S. A.

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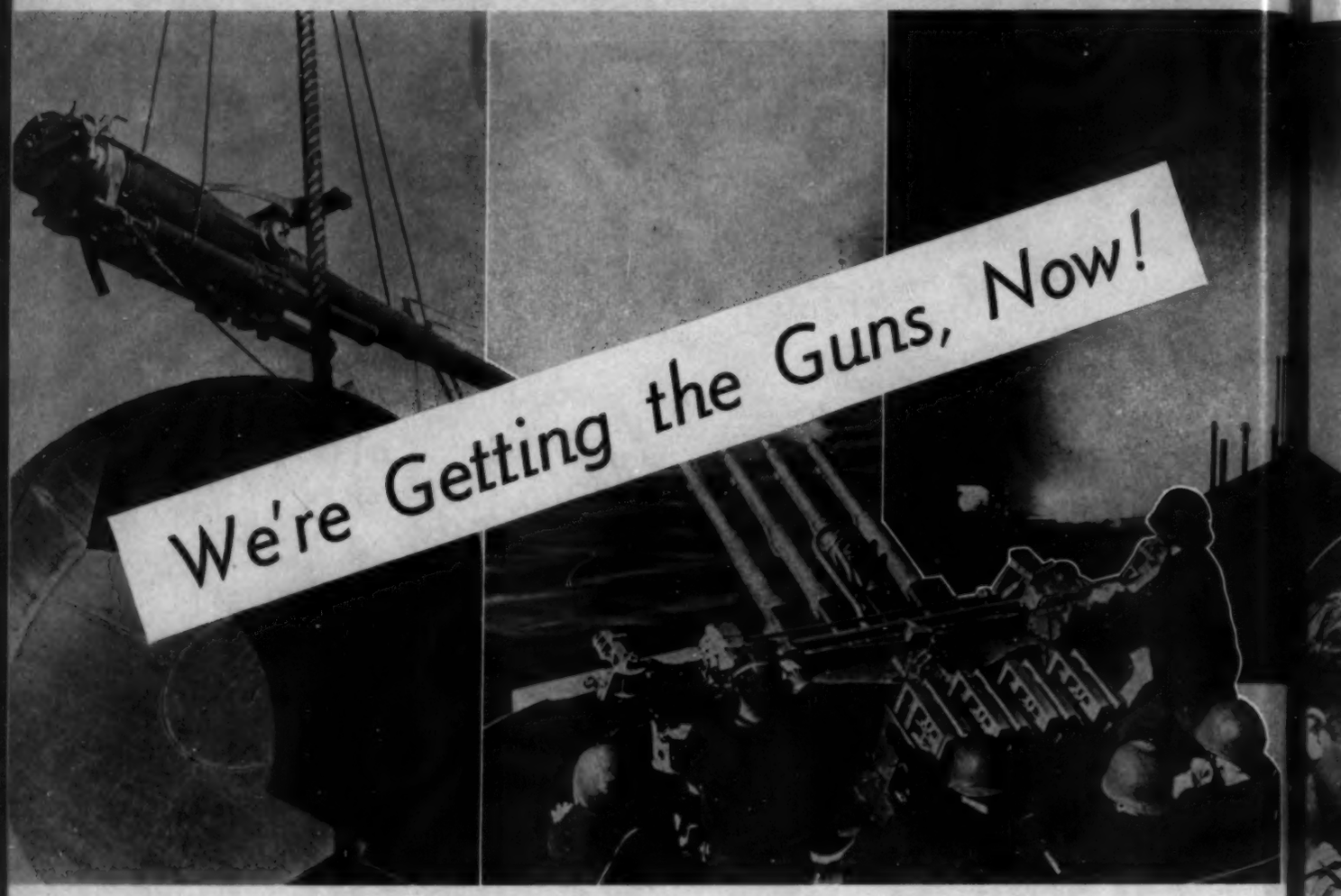

We're Getting the Guns, Now!

Production record demonstrates emphatically industry is pressing war effort. . . But management also looks ahead to the time when hostilities cease and it must convert facilities and adapt policies to peacetime conditions

INDUSTRY is not coasting. Output records emphatically demonstrate herculean effort is being expended in the nation's factories providing our fighting men with the tools essential to victory.

Munitions and equipment are flowing to the fighting fronts in ever-mounting volume, assuring those at grips with the enemy they are being backed to the limit on the production front in the drive to terminate the war successfully and as quickly as possible.

Industry is equal to its responsibility in the struggle. The production records bear this out. But industry's responsibility as an economic and social force extends beyond the day of battle. It must look ahead to the time when hostilities cease; to the day of transition from war to peace.

Whether the war lasts but a few months or continues several years, industrial management is cognizant it will bear a heavy responsibility in the postwar era. Rapid and orderly transition to a peacetime economy must be assured and the success industry attains in developing policy now which permits of quick adjustment to postwar conditions will measure the degree to which private enterprise, as such, contributes to the peace.

What is industry doing in preparation for the postwar era?

Survey by STEEL's editors shows industrial management is in a difficult position promoting a two-pronged effort of producing for war and preparing for peace. It is caught between two opposing factions in Washington.

One, associated with the direct conduct of the war, fears industry will let down on production of essential war material. The other, the planning group affiliated with the permanent government agencies, is just as fearful we will lose the peace if the national economy collapses upon cessation of hostilities.

The evidence gathered to date definitely indicates the fears of both factions are exaggerated.

Industry is aware it still has 60 per cent of the $83,000,000,000 war program for 1943 to complete and that 1944 program will be even larger based upon known factors. It also knows production is increasing month by month according to plan. Only within the past few months has industry approached a fully tooled-up stage as demonstrated by the fact cost of plants and equipment was within 10 per cent of the value of munitions produced up to Jan. 1, 1943.

Industry also knows it faces some pretty tough production jolts in the next year or so, that it cannot plan the placid schedules of a peacetime era. Take the case of the midwestern tool and die maker who a few days ago was advertising for workers to maintain 3-shift operations. A sudden stop order has dropped operations to two shifts. Or, take the case of the Detroit tank arsenal which will be ripped up and converted to production of heavy bomber parts.

We'll Need Plowshares Later!

From the factories of the nation pours a stream of war goods in ever-mounting volume but industry is not unmindful of the future when the drums of war are stilled and civilization resumes its upward march. Photos at extreme left, United States Navy; circle, Office of War Information; auto and plane styling by George W. Walker, Detroit

There are many others thus affected.

As an indication of what is ahead, it is officially estimated the armed forces are likely to encounter a 30 per cent error in types of equipment when the invasion of Europe actually gets under way, based upon experience in North Africa. It means that industry must be "faster on its feet" in making production shifts, as one WPB vice chairman puts it. And, some companies with equipment which cannot be readily converted to other work admittedly will be "left out in the cold".

Despite all the uncertainties attached to production of undeterminable quantities of war goods, there is no strong evidence that industry is falling down on the job. It is meeting schedules whenever the material supply, production facility and labor factors are within reasonable control. According to last reports a certain new metal reduction plant was still unable to operate at anything near capacity for the reason scouting parties, even to distant cities, were unable to corral the 200 laborers required. The blame can be pinned on circumstances, not the company involved.

Aside from direct war production, executives are finding time for much discussed and equally misunderstood "postwar planning", which mistakenly carries the connotation of "planning for selfish interests".

Reasons for Postwar Planning

The reasons for planning are simple. The Washington planners already are talking in terms of a jazzed-up postwar economy—and probably justifiably—which would make 1940 appear like a depression year compared with projected levels for 1946. The gross national product (total output of goods and services, excluding sales of products to other enterprises for further fabrication, but including sales to others for capital investment) in 1940 was $97 billions. In 1946, a national gross product of $142 billions at 1940 price levels ($165 billions at 1942 levels) will be necessary to support the 10,000,000 additional workers available through population increase and advances in technology.

Industry will find it necessary to bear a big part of the load in finding employment for these people. And, as stated publicly by WPB Vice Chairman Arthur D. Whiteside recently, it is essential for the men coming home from the battlefronts after the war to find a sound civilian economy.

Much of the planning being done today is made necessary by the problems constantly arising from the war program but it also has postwar implications. This may be amply demonstrated by citing a few examples.

New triplexing equipment now being installed will double production of electric furnace steel. The process combines 130-inch special design cupolas with 12-ton converters and 40-ton electric furnaces. Production will be stepped up to 20 tons an hour from a 10-ton rate when charging cold metal. Further, the cupola practice will permit use of bor-

ings, turnings and other light grades of scrap. A blast furnace—tilting open-hearth—electric furnace combination is regarded equally promising for producing low cost alloy steel now and later.

In the copper and brass industry, a method for continuous annealing of rod is being perfected. As the rod emerges from an annealing furnace the size of an oil drum, it is automatically quenched and passed on to the next roll or die. Backers of the process expect it will be extended in peacetime to heating billets, both nonferrous and ferrous, with cross-sections up to 8 inches.

A new pressure quench system designed to prevent warpage in armor plate when being quenched will be used in peacetime in processing items requiring extremely flat surfaces, such as circular saws. The same system has been used successfully in treating bar stock. One manufacturer who developed a line of special purpose tools for machining A.P. shot and shell cases expects to adapt it quickly for other uses. A third company has risen as a "war baby" through perfection of methods for manufacturing microscopic precision tools, such as tiny drills which will pierce barely-visible holes only 0.003-inch in diameter through alloy steel. Postwar applications for these tiny, precision holes are many, including a new hypodermic syringe requiring no needle, new long-distance television equipment and a new-type diesel engine jet which cuts down fuel consumption, increases horsepower and may at last swing this type of power plant into the automotive field.

Degrees of Progress Vary

Just how active is postwar planning? The range is extremely broad, extending from companies with postwar committees, a special postwar budget and products either ready to go or in the drawing board stage, to others whose executives are just "thinking".

Take the example of a manufacturer of a certain type of transmission equipment. The committee, which meets regularly each week and comprises top sales, production and technical men, figures its old standby line will be largely out of the picture later on. So, it is pretty well committed to production of a pressed metal window for the building field where a boom is anticipated, a hand truck which possibly will be motorized to compete with several popular models now on the market, a speed jack and a speed reduction drive. These are the items now in the picture. Others may be added later. The same company does not expect to maintain employment at twice its present total of 1000, which is regarded inflated.

An extremely large consumer of steel and other materials has stainless steel on hand for 26 cars which cannot be fabricated under WPB regulations. After the war, this company will go after the railroad passenger car replacement market with the same type of cars built of stainless but perhaps "dressed up a bit with plastics".

Prospects for Other Lines

It has a contract for stainless steel cargo planes which will be built in a new plant. This business would appear to be a likely carryover to postwar, since aircraft parts production has been undergoing a process of continual improvement in its plants for several years. Another department making stainless funnels and masts for the Navy probably will be switched back to truck bodies, also of stainless. The automobile body division, now revamped for production of aircraft parts will be reconverted.

By way of contrast, it would be well to examine the plans of a storage battery maker now busy on work for the armed forces. This company's active committee, in analyzing postwar possibilities, anticipates a sharp fillip in sales of material handling equipment and therefore batteries for power. Handling has not kept pace with improvements in manufacturing methods and actually only a comparatively few companies are regarded to have efficient systems. Extensive damage to military supplies and equipment shipped abroad through faulty packaging and handling has driven home the need for improvement and the more extensive use of the unit loading system, as one example, has been an immediate result.

A maker of flexible metal tubing is studying peacetime possibilities through its production research department comprising an economist, industrial engineer, public accountant, mechanical engineer

(*Please turn to Page* 166)

No production slowup here. Long lines of Lockheed Lightning fighters were moved outdoors for final assembly operations during an 8-day period in which the factory was switched over to a continuously-moving mechanized line

Support, Opposition to Scrugham Bill Expressed at Senate Hearings

Measure provides for storing strategic materials at government expense after war ends. . . State Department fears enactment would handicap development of foreign trade relations

HEARINGS conducted by the Senate Special Committee to Study and Survey the Problems of Small Business Enterprises reveal powerful opposition to, as well as support for, the bill introduced recently by Sen. James G. Scrugham, Nevada, S. 1160, which if enacted, would provide for stockpiling strategic minerals at government expense, purchases for this purpose to begin immediately after the termination of hostilities.

All purchases, for one year, would be made from "those small or marginal mining enterprises which shall have been in operation prior to the termination of present hostilities and to which any loan was made by a government agency, or to which a premium quota was issued, or any investment in which is otherwise shown to have been made with the intent and purpose of augmenting war production".

Provides Purchase Plan

After the first year such purchases would be made over a period of four years from mines whose operation would be certified by the Bureau of Mines as "desirable in the public interest and beneficial to the national economy".

The bill calls for creation of a Stock Pile Advisory Committee to be composed of an outstanding member of the mining industry, to serve without compensation, the Secretary of War, the Secretary of the Navy, the Secretary of the Interior, and the chairman of the War Production Board.

"The committee", the bill reads, "is authorized and directed to proceed to estimate promptly, after appropriate survey, inquiry and research, the quantity in which each mineral deemed by it to be strategic and critical shall be stored, stockpiled, or otherwise accumulated to supply the requirements of a total war of three years' duration or of any equivalent emergency".

"Upon termination of the present hostilities," the bill provides, "all stockpiles then held within the continental United States, including Alaska, by the Metals Reserve Co. or its successors, and by any other government agency except the Department of War and the Department of the Navy, shall be transferred to and consolidated in the possession of the company which shall thereupon hold the same intact as trustee for the committee . . . subject to its exclusive direction and control. . . . All stockpiles shall be held exclusively for use in any national emergency."

The minerals would be purchased "from domestic producers at a price which shall not be less than will afford to such producers a fair and reasonable profit, except that for the first 12 months following the conclusion of the present hostilities such price shall not be less than the highest ceiling price or the highest Metals Reserve Co. schedule price (whichever shall be higher) in effect during the 12 months' period immediately prior thereto for the particular mineral authorized to be purchased."

The bill provides that "no such purchase or other acquision shall be made from any foreign source unless (a) the particular requirement in each instance cannot be supplied from domestic sources under the conditions above provided, and (b) any such foreign purchase is specifically authorized by the committee".

The bill states definitely that while the Bureau of Mines is to furnish supervision and advice as the committee calls for such assistance, no government agency is to have authority to operate any mine. The Metals Reserve Co., however, on authorization by the committee, is authorized to utilize such excess capacity as may exist at any private or government smelter, refinery, reduction or processing plant through contractual arrangements, "provided, that the product thereof or its equivalent in quantity and quality shall be returned to the appropriate stockpile."

Some Legislators Urge Enactment

Congressman Charles A. Plumly, Vermont, Congressman Compton I. White, Idaho, Congressman John R. Murdock, Arizona and Delegate Anthony J. Dimond, Alaska, all praised the bill and urged that it be enacted.

Dr. R. R. Sayers, Bureau of Mines director, held stockpiling should have been done after the first World War and that this omission must not be repeated after this war. Much work is to be done to find out more about minerals.

Julian D. Conover, secretary, American Mining Congress, put his organization on record as favoring the bill.

J. Carson Adkerson, American Manganese Producers Association, responded to questions by insisting that domestic manganese producers be kept going after the war; technological developments during this war, he said have proved we have a vast quantity of manganese ore in this country and we are in no danger of exhausting our reserves.

Franklin G. Pardee, Appraiser of Mines, State of Michigan, Lansing, Mich., testified that at the rate at which we are exhausting our reserves of easily won open-pit iron ore it is doubly important that iron ore be stockpiled.

Opposition to the bill was expressed in a statement by the Department of State. If this bill should become a law, said the statement, the Department of State would be sharply handicapped in developing trade relations with various foreign countries. It would be unable to bargain effectively with its hands thus tied. In particular, it would be unable to purchase strategic minerals from friendly countries where we want to minimize economic dislocations after the war, a matter of very grave importance since severe dislocations in friendly countries would make things worse here. The Department of State also believes the bill would have a bad effect by creating, as it would, 2-price setups on the various minerals.

Professor Criticizes Bill

Another sharp criticism came from Dr. Thomas T. Read, professor of mining engineering, Columbia University, New York, and a spokesman for the American Institute of Mining and Metallurgical Engineers. The bill would give entirely too much power to the Bureau of Mines which, in effect, would have the mining industry under its thumb.

"Before we decide to keep marginal properties going on an uneconomic basis it will be better to wait for technological developments that will make it possible to work these properties economically", said Dr. Read. "As an example, when talk about stockpiling gasoline started in 1923, it would have required three times as much petroleum to produce a gallon of gasoline as it does now. That is because of technological improvements."

Nature of some questions revealed at least some members of the committee question the soundness of S. 1160. Sen. Chapman Revercomb, West Virginia, in particular, expressed doubts as to the wisdom of putting such vast power over industry in the hands of government. The bill, he feared, would socialize the mining industry if enacted in its present form.

PRIORITIES-ALLOCATIONS-PRICES

Weekly summaries of orders and regulations, together with official interpretations and directives, issued by War Production Board and Office of Price Administration

CMP REGULATIONS

STEEL DELIVERIES: Steel producers must notify their customers as soon as they find out a delivery cannot be made in month requested. Each producer must notify War Production Board in writing as soon as he determines that shipment cannot be made within 30 days after the requested month. (CMP Reg. No. 1)

BRASS MILLS: Direction No. 4 under CMP regulation No. 1, covering production of orders by brass mills, has been amended to make the direction applicable indefinitely. The program symbol N-1, heretofore used to cover certain ammunition programs, has been changed to N-4 in the amended version. (CMP Reg. No. 1)

TIN PLATE: Tin plate for can manufacturers may be made in advance and held at steel mills for later shipment as directed by the can manufacturer, War Production Board has ruled. This applies to all producers of tin plate, short ternes, and tin mill black plate. (CMP Reg. No. 1)

STEEL SHOE WIRE: WPB points out that steel wire is the only kind of wire used in making footwear which may be treated as an operating supply under CMP, regardless of the manufacturer's particular accounting practice. Previously any wire used in manufacture of footwear, including copper and aluminum wire, might have been obtained under the MRO procedure, if otherwise permitted by WPB orders. (CMP Ref. No. 5)

WELDING RODS: Arc welding electrodes and gas welding rod used for manufacturing purposes may not be treated as an operating supply under CMP regulation No. 5, even though it is carried as such under established accounting practice. A manufacturer may use the rating assigned under the MRO regulation, however, to get his requirements of welding rod for repairing his own equipment. (CMP Reg. No. 5)

L ORDERS

LOCOMOTIVE PARTS: Delivery of 54 critical locomotive equipment components now can be made only in accordance with schedules approved by WPB which may direct the return or cancellation of any order on the books of a manufacturer, may direct changes in the delivery or production schedule of a manufacturer and may allocate orders placed with one manufacturer to another. (L-97-d)

STEEL TUBING: Use of seamless steel tubing in manufacture of finned coil or tube assemblies as part of refrigerating equipment is permitted until Sept. 15, 1943. Seamless tubing may be used by those manufacturers who have to expand the tubing to make the bond between it and the fins. (L-126)

LABORATORY MATERIAL: Delivery of any one item or quantity of the same item of laboratory equipment having a value of $50 or more, or delivery on a purchase order worth $200 or more is prohibited unless authorized by WPB on form WPB-1414 (formerly PD-620). Purchase orders of the Army and Navy and laboratories which have obtained serial numbers under order P-43 as amended are exempted from this restriction, except on orders for certain highly critical equipment named on List A attached to the order. (L-144)

POWER SWITCHGEAR: Schedule IV of order L-154 now permits an estimated saving of more than 3000 tons of carbon steel and 2,000,000 pounds of copper annually in production of power switchgears. Steps in the conservation program are: Operating all copper current carrying parts at higher current densities than those previously accepted as standard in the industry; eliminating many portions of steel enclosures and reducing the gage of steel in others; substituting wood or other materials for structural steel in fabrication of outdoor substation structures; eliminating duplicate connections, unnecessary hardware and non-essential instruments.

Schedule V is concerned largely with reducing the number of types of high voltage insulators that may be manufactured.

ELECTRICAL CONDUIT: Manufacture of electrical metallic tubing is limited to 75% and of flexible metal conduit or tubing to 50% of 1941 production by the following provisions of L-225 as amended: metal used in manufacture of thin wall conduit during any month is restricted to 1/16 of total weight of metal used during 1941 and of flexible metal conduit to 1/24. Following changes also have been made: Prohibits for all items covered by the order the manufacture of sizes greater than the minimum sizes permitted by the 1940 edition of the National Electrical Code; tightens restrictions on permitted uses of conduit by exempting installations in "wet locations"; exempts conduit used to suspend industrial lighting fixtures weighing 4 lbs. or more from specified restrictions on manufacture and installation; limits sale by manufacturers of all items to purchase orders rated A-1-j or better; permits sales from one manufacturer to another and from one distributor to another without preference ratings in order to balance stocks; permits extension of ratings for heavy wall conduit to an equal amount (in linear feet) of thin wall conduit of the same size, and vice versa; requires reports on form WPB-2474 by 15th of each month from manufacturers of conduit on shipments, finished inventory on hand, etc.; imposes specified restrictions on installation of raceways, effective July 9. Manufacturing restrictions are effective as of July 1. (L-225)

WELDED CHAIN: Simplified practices in manufacture of welded and weldless chain and an allocation of production to promote the flow of certain quantities of chain into the hands of distributors and retailers for sale to farmers and other important "consumer level" users have been established. Certain special types of chains manufactured for direct war or industrial users are specifically excepted. (L-302)

INDEX OF ORDER REVISIONS

Subject	Designation
Aluminum Scrap	M-1-d
Brass Mills	CMP No. 1
Chain, Welded	L-302
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Copper Plumbing Fixtures	M-9-c-4
Laboratory Material	L-144, P-43
Locomotive Parts	L-97-d
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Steel Deliveries	CMP No. 1
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Telegraph Equipment	U-6
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Ferrochromium	No. 407
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Manganese Alloys	No. 138
Pigments, Color	No. 180
Refractory Products	No. 416
Refrigeration	GMPR
Tanks, Steel Storage	No. 411

M ORDERS

ALUMINUM SCRAP: Aluminum (not including engines or engine parts) recovered from wrecked aircraft as well as scrap recovered from repairs of ships must be delivered only to dealers, unless it has been prepared by removing non-aluminum parts to the extent practicable and by cutting or shearing the scrap into pieces not exceeding 24 in. by 60 in. Scrap thus prepared, and engines and engine parts, may be delivered to an approved smelter as well as a dealer. Only those plants generating 10,000 lb. or more of aluminum scrap in any month must file monthly reports. Those generating 1000 to 10,000 lb. a month must file quarterly reports. Those generating less than 1000 lb. a month are relieved of the necessity of reporting. (M-1-d)

COPPER FIXTURES: Following copper and copper-base alloy plumbing fixtures and trim and building materials have been placed on list of materials which civilians are not permitted to use: Bath supplies, less flanges; closet floor flanges; cast brass rigid traps; shower arms, less flanges; shower curtain rods; cast brass shower curtain rod flanges; cast or forged shower heads; continuous waste arms and tees;

Access panels, anchors and dowels, cornices, drip pins, fences and gates, flashings and flashing valley lining, gravel stops and snow guards, lightning rods, cables and accessories, louvers and marquees, partitions, radiators, shields and covers, store fronts, thresholds and sadd'es, window frames and sills, ventilators, skylights and vents.

Use of copper and copper-base alloy fittings for a water supply or distribution system outside of a building is confined to cases where the fitting is to be installed underground. Fittings may be used, however, for repair purposes to connect new lead or iron pipe to copper or brass pipe or tubing already in place. Permission to use the restricted products can be had only through application to the Copper Division of WPB. (M-9-c-4)

STEEL WAREHOUSES: Provision of order M-21-b-1 which required that at least 25% of a fabricator's business be of a warehouse nature before he could qualify as a warehouse no longer applies. Small distributors who stock no steel products except drill rod and tool bits are authorized to continue such operations without getting a warehouse certificate, the PD-83-b form under order M-21-b, or the PDL-228 form under CMP. Quantity restrictions on product groups for small warehouses now are based on type, such as carbon steel, rather than individual products, such as hot-rolled carbon bars. Purchases for stock by one warehouse from another is permitted by using form CMP-11 to cover inter-warehouse transactions. Such operations are subject to quantity limitations imposed by CMP regulation No. 4 on sales of controlled materials by warehouses and dealers to consumers. (M-21-b-1)

U ORDERS

TELEGRAPH EQUIPMENT: New installations of telegraph equipment is limited to essential users. Telegraph and cable companies are required to practice careful conservation in all use of equipment and re-use existing equipment wherever possible. (U-6)

P ORDERS

CONSTRUCTION: Preference rating orders P-14-a and P-14-b, under which Maritime Commission shipyards were given preference for purchases of materials in constructing shipways and other facilities, have been revoked. Materials for construction of shipyard facilities

now are obtained by use of form WPB-617, formerly PD-200. (P-14-a and P-14-b)

LABORATORY MATERIAL: Preference ratings and an allotment symbol are assigned to all laboratories to assist them in obtaining all materials and equipment needed to carry on scientific or technological activities. Those carrying on work of great importance to the war effort are entitled to obtain a serial number under an amendment to order P-43; and if they obtain a serial number, they may use a higher preference rating than other laboratories. All laboratories owned or operated by the Army or Navy receive high preference ratings. (P-43)

PRICE REGULATIONS

REFRIGERATION: Ceiling of 75% of present list prices for new parts and subassemblies has been established for reconditioned or rebuilt parts or subassemblies for commercial refrigeration equipment when sold by reconditioners. However, these reconditioned items, sold by manufacturers during March, 1942, remain under provisions of general maximum price regulation at the highest price charged during that month by each manufacturer. (General Maximum Price Regulation)

MACHINERY: Lessors of machinery for which he had no published or confidential rate in effect on Oct. 1, 1941, are required to submit a proposed maximum rental rate and certain descriptive data to OPA. The price must be in line with the rates charged on Oct. 1, 1941, for the same machine or a similar one. (No. 136)

COLOR PIGMENTS: Red lead and orange mineral color pigments have been exempted as of May 14 from the price regulation on color pigments. They will continue to be priced under the general maximum price regulation until a separate regulation on lead pigment paints is issued. (No. 180)

MAGNESIUM SCRAP: Buyers of magnesium scrap may pay dealers a service charge for picking up the scrap and loading it into railroad cars. Maximum price which seller may charge, however, must be reduced by an amount reflecting cost of loading the material for shipment. Remelt magnesium ingot containing 99% or more pure magnesium is exempted from price control. An adjustable pricing provision has been added to the order. (No. 302)

STEEL STORAGE TANKS: Specific maximum prices have been established for reusable steel storage tanks. Allowances for dismantling and cleaning also have been established for various types and sizes. (No. 411)

HINGES: Prices quoted on Oct. 1, 1941, have been established as the maximum manufacturers' prices for hinges and butt hinges. Ceilings have been established also for sales by jobbers. (No. 413)

REFRACTORY PRODUCTS: Maximum prices have been established for basic refractory brick, dead-burned dolomite, dead-burned grain magnesite, and kindred products used in masonry linings of metallurgical and industrial furnaces. Price levels are not altered by the new order. Please turn to page 158 for details. (No. 416)

MANGANESE ALLOYS AND METAL: Specific maximum prices for ferromanganese and manganese alloys and metals have been established in a new price regulation. Prices provided are essentially the same as those previously in effect, except minor increases to cover expenses of freight and handling of the two smallest sizes of standard ferromanganese, now being ground by request by one company at the request of War Production Board. Please turn to page 157 for details. (No. 138)

FERROCHROMIUM: Maximum prices at which independent warehousemen may sell ferrochromium or chromium metal is the producers' prices to warehousemen plus 10% for quantities of 500 lb. and over, 15% for amounts of 100 to 500 lb., and 20% for amounts less than 100 lb. Additional details are published on page 158. (No. 407)

Smaller War Plants Corp. Reports Sharp Gain in Loans and Leases

TOTAL LOANS and leases made by Smaller War Plants Corp. up to June 15 reached 308, having a total value of $12,553,835. This was revealed by Brig. Gen. Robert W. Johnson, chairman of the corporation, in his second bi-monthly progress report on the corporation's activities.

The aggregate value of new loans approved during the last 60-day period was 2.5 times as large as that of the previous period, while the dollar volume of the loans made and closed in the field alone was 12 times greater.

The aggregate value of new authorizations for the purchase of equipment or leases reported during the current period is almost twice as large as that for the previous period.

Contracts Fully Allocated

To June 15, through the direct efforts of SWPC, 4100 firms have received prime contracts of a total value of $750,000,000, and a further 4200 firms have received subcontracts totaling $251,000,000. Allocations of these contracts have been made through the regional and field offices under the SWPC decentralization policy.

From June, 1942, to June, 1943, the corporation has received 645 applications for financial assistance totaling $46,854,985 and of this number 331 applications aggregating $14,080,242 were approved and the remainder are being processed or were either rejected or referred to other agencies. Subsequent to their original approval, 23 loans and leases totaling $1,556,525 were canceled and 10 were increased by a total of $30,118, making the net authorizations through June 5, 1943, $12,553,835.

For the bi-monthly period covered by this report the corporation approved 148 applications from 146 firms for new loans totaling $5,883,213, and 12 loans totaling $799,500 were canceled or rescinded. Of the applications acted upon, 60 loans totaling $755,190 were made in the field by the corporation's regional loan agents without reference to Washington.

New authorizations have been made for the purchase by the corporation of equipment valued at $1,303,626 which was leased to 50 firms and approval was given to increase the value by $34,137 of the amount previously reported in respect to equipment to be purchased for lease by five firms.

In the first year of its operation the corporation itself has taken four prime contracts totaling $11,010,847 in value which have been completely subcontracted.

The number of small firms assisted by the corporation in obtaining prime contracts from government procurement agencies continues to increase. During the eight weeks' period ended April 3, 1943, prime contracts valued at $259,000 were reported to have been placed with 1347 firms while during the corresponding period ended June 5, 1943, the value of prime contracts rose to $295,000,000. These have been placed with 1972 firms, an increase in value of 14 per cent and in number of firms, 29 per cent.

The corporation will continue in its policy of giving first consideration to plants most in need of work, but will not confine its activities to plants in distress according to the definition of the corporation.

In dealing with subcontracting, the report concludes that the importance of the problem warrants the establishing of a separate Sub-contracting Division.

Forms Simplified Under Premium Price Plan

Simplification of forms used in establishing or revising mine quotas under the Premium Price Plan for copper, lead and zinc has been announced by the quota committee, which is composed of representatives of the Office of Price Administration and War Production Board.

The revision of forms is the result of extensions and changes of the Premium Price Plan, and experience which operators and the committee have had since last fall in use of the forms. Now operators of from 1500 to 2000 mines are relieved of considerable paper-work, and the committee is able to operate with more speed and precision.

Five forms are affected (all of them available from the Secretary of the Committee at Washington):

WPB form 1572 for reports from operating mines of operating data and costs.

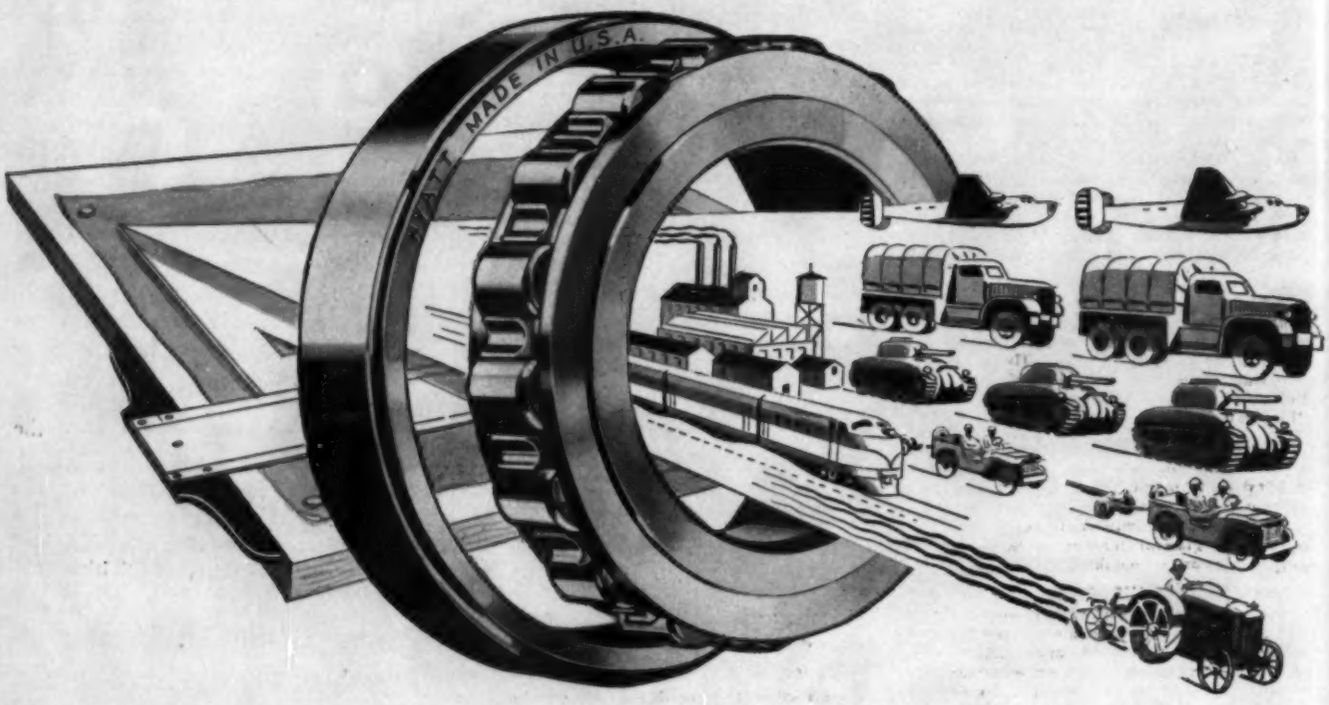
WPB form 2465 for new mines.

WPB form 2822 for operating mines without mills.

WPB form 1699 for mines in the Tri-State district (a section that includes parts of Kansas, Oklahoma and Missouri).

WPB IND-1 for notification of quota revisions.

Blueprints of Victory now flow from Boards which conceived America's Industrial Leadership



To design engineers, accustomed to overcoming mechanical obstacles in their stride, the Axis was just another problem for them to lick.

So they reached into their bag of tricks...the old American "know-how"...and came up with a thousand nightmares for the Axis dream.

And in designing these mighty weapons they naturally called on one of their chief stocks in trade—dependable Hyatt Roller Bearings, to help them in the job.

For that reason, you'll find Hyatt Roller Bearings built into the tools of fighting as well as farming, into tanks as well as trucks, into ships as well as machine shops, into warplanes as well as war workers' cars... carrying on their uninterrupted fight against friction and wear, making possible better design and, of course, the better performance which goes with it.

Hyatt Bearings Division, General Motors Corporation, Harrison, N. J.

HYATT ROLLER BEARINGS

By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Communities not serviced by railroads experiencing difficulties with motor transport due to shortage of repair parts, trucks, mechanics and other restrictions. . . Kaiser pictured in "jeepette," prototype of $400 auto he plans to build

SAMPLING a cross section of opinion in the nation's communities not served by railroads, the statistical department of the Automotive Council for War Production finds that on the basis of a 25 per cent return of 1100 questionnaires, 49 per cent of these communities are having difficulties with motor transport facilities due to shortage of repair parts, 33 per cent due to lack of vehicles, 33 per cent because of shortage of mechanics, 19 per cent because of shortage of drivers, 13 per cent from shortage of tires and 5 per cent due to other wartime restrictions. Some communities of course report on more than one of these factors. Out of 270 replies received, 104 cited transport difficulties.

In 1930 there were in the United States 48,000 communities without rail service which were almost entirely dependent on motor transport for shipment of goods produced and receipt of supplies. Ten years later, due to railroad abandonments and other factors, the number of such communities had grown to 54,000, representing 40 per cent of all cities in the country and a population of nearly 8,000,000, or 6 per cent of the nation's total nonfarm population. And since they are in rural areas, they serve many times the number within their own boundaries.

Dependent on Motor Transport

Although it has not been possible to determine exactly the additional population which is thus dependent on motor trucks, it is noteworthy that even within the boundaries of communities not served by rail a great proportion of the population of certain states is without rail service. For example, 30 per cent of the nonfarm population of Maine, and 24 per cent of the nonfarm population of Vermont are located in communities not served by rail. There are 15 states where 10 per cent or more of the nonfarm population is living in these railless communities.

An added factor, affecting areas which are served by rail, is the fact that with such a large volume of war goods taking priority on railroads, normal shipping suffers. An example is the case of a small woodworking shop near Detroit whose owner worked out a plan for mass production of mailboxes for new housing projects. He planned to use Oregon plywood and even went so far as to build up his fixtures and line up certain machines. Then he was told that the ODT would not grant priority for rail shipment of plywood stock from Oregon to Detroit. Apparently mailboxes are considered nonessential items.

Some of the detailed comment in reports to the ACWP are of interest. Polacca, Ariz., population 900, states: "Nearest rail stations are Winslow, 80 miles and Holbrook, 89 miles. Serious shortages of repair parts evident—often unobtainable in either city. Mechanics and mechanics' shops are as scarce as hen's teeth."

Burney, Calif., population 1350, says: "Our only method of transportation is automotive. Lumber is hauled out by truck and supplies brought in the same way. There is a serious shortage of trucks, drivers and repair parts, making deliveries subject to delays of from one to two weeks. Practically all lumber produced here goes into war work. Often shipments are delayed because of insufficient trucks. This is a serious handicap to sawmills."

Meeker, Colo., population 2000, observes: "The shortage of manpower coupled with restrictions on mileage are handicapping the ranchers very much. All road operations in this country are on rubber. We use a large number of pickups for every purpose imaginable, but cannot show very heavy ton loads. Our distances are tremendous. We helped ranchers last fall to make up questionnaires for gas. Some of these men came as far as 75 miles and spent whole days to answer the bunch of fool questions that were put to them. Few ranchers know how much they haul in a year or their total mileage, or whether they hauled more black calves than white. There is little joy riding here, but we must get out and see a railroad once in a while, and to also have an

"DUCK" UNDERGOES TEST: Amphibian trucks can pull themselves out of mud or quicksand with astonishing ease by means of a power-driven winch. Winch cable is attached to a tree, post or any solid object and the engine-driven winch does the rest. Above, the amphibian is being subjected to the "bathtub" test for water leaks at General Motors Truck and Coach factory

occasional appendix taken out."

Lubec, Maine, population 3100, says: "There is a serious shortage of transportation facilities, due to lack of vehicles which, incidentally, is caused by the reluctance of the WPB to release vehicles in this area. . . . We are producing at least 75 per cent of the entire Maine pack of sardines, of which 80 per cent are taken by the U. S. under lend-lease."

And Humansville, Mo., population 786: "We are told by the ODT to load to full capacity and when we do this Kansas City police pick us up and fine us for being a little over the maximum weight."

Wistfully, New Athens, O., population 500, concludes: "It is almost impossible to get repair parts as we have no repair shops."

Society note: Mr. and Mrs. Henry J. Kaiser and son, Henry Jr., passed through here a week ago Friday and had their picture taken behind the steering wheel of what was purported to be a prototype of the $400 automobile which the senior Kaiser told a newspaper reporter he would probably sell through gas stations, for cash, with no tradeins. The vehicle in which the family sat was the jeepette which contractors Kaiser has retained here are building for the Ordnance Department, with the hope of getting a quantity order after the first samples have been submitted.

Subcontractors Lined Up

Mr. Kaiser said he would substitute aluminum and magnesium for most of the iron and steel in the car, and pointed out that he now has 52 subcontractors lined up to supply parts for the military vehicle which weighs something like 1300 pounds, and will be powered by a 4-cylinder air-cooled engine.

Engineers are reported to be working on still another type of military car, weighing only 1000 pounds and powered by a 2-cylinder engine. Logical endpoint of this development process would be two motorized roller skates.

The Kaisers left Friday night and by Saturday ordnance officers were reported somewhat ruffled over the fact that anyone had been permitted to see the embryo jeepette.

Mr. Kaiser was quoted as saying that his staff was working on a "16-cylinder horizontal-opposed radial engine" to power the passenger car he hopes some day to build. For some reason or other, the more interviews Kaiser gives out to the press around Detroit the less concerned the industry here is over any future competition from him. In fact, Kaiser assured the industry he had no designs on its markets, pointing out that the introduction of a $400 car would at the same time boom the sales of cars in the higher price classes.

Nash Kelvinator Corp. has distributed 26,000 copies of a special 32-page booklet titled, *Your Hidden Treasure*, containing pointers to help employes understand and evaluate the new payroll deductions of income taxes as well as social security, war bonds and other deductions from payroll income. The book explains in detail the various deductions and contains blank forms on which an employe can keep a year's record of his income and the deductions therefrom.

"The thinking behind the book," states George W. Mason, president of N-K, "is that too few workers today know more than a few sketchy facts about what they are paying for through payroll deductions taken out of their checks. From 15 to 20 per cent, even before income tax deductions, is sliced off the average U. S. workman's paycheck each week, yet little effort has been made to explain thoroughly to workers what they are getting for their money. We believe this little book helps to do the job."

New peak in General Motors scrap collections has been reported for the first four months of the year, total collections of all types of scrap metal amounting to 463,807,462 pounds or about 232,000 net tons. This figure compares with 401,691,615 pounds in the preceding four months, and 285,698,531 pounds a year ago.

Intensified production of war material is of course the principal explanation of the increase, but thorough "housecleaning" is still in process and resulted in accumulation of over 20,000 tons of nonproduction scrap in the four-month period.

Hudson Motor Car Co. scrap iron and steel total for April was just short of 500 tons, bringing to about 7000 tons the company's collection since June 1, 1942. About 20 per cent of the April collection was nonproduction scrap. Aluminum scrap collected in April at Hudson rose to 292,839 pounds, making an 11-month total for this material of 2,383,890 pounds.

Urges Minimum Inventories

Courtney Johnson, Studebaker Corp. official and head of the controlled materials committee of the Automotive Council for War Production, predicts tough sledding for companies which are not holding inventories of raw materials and parts to the lowest possible working levels to accomplish necessary production. He points out that government contracts with industry at the present time amount to over 100 billion dollars, a figure which may be held fairly level for the duration. When these contracts are terminated, either individually during the war, or collectively after the war, government will owe industry vast amounts of money for materials on hand and parts in process. In other words, industry's working capital will be tied up to a large extent in inventories procured for government contracts.

Studying problems involved in morale of workers, a group of industry authorities has drawn up a series of helpful hints for employers. They include:

Keep your employes informed of how the plant is meeting its schedules, by means of scoreboards, bulletin boards, charts, thermometers, etc.

Inform your employes well in advance of any contemplated change in working hours.

Keep the worker informed as to his wage rate, job classification and what is expected of him.

Emphasize to the employe the importance of his job and its importance to the production of the plant as a whole.

Train your foremen well in the art of handling people. (One company goes so far as to inform its foremen in advance of the nickname or favorite name of new employes being sent to them).

Merit awards are effective, particularly if competition for awards are on a group, rather than individual, basis.

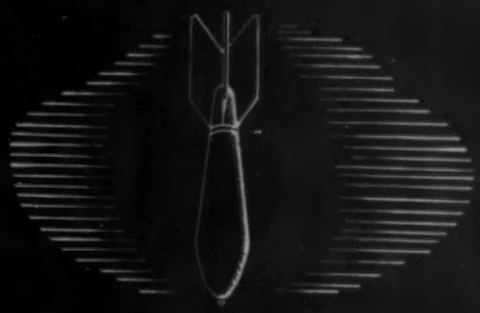
Encourage suggestions from employes as this helps to maintain their interest in production problems.

RIOTING IS COSTLY

Pointing to the far-reaching costs of the recent rioting in Detroit, Joseph D. Keenan, WPB vice chairman for labor production, last week called on labor and management in every war industry center to get together with other civic groups to correct the causes of racial strife.

Preliminary estimates indicate that the Detroit rioting directly caused absences from work totaling more than one million manhours. That is only a small part of the total cost to war production.

From a preliminary survey, it is estimated that the two days of rioting cost the nation a worse setback in the production of planes, tanks, material and other equipment than it had suffered from all the labor disputes in the entire nation in the first two months of this year.



Who Wins Wars?

Strangely enough, the average man does! Much as we all detest war the fact is that under its stimulation a nation always develops new products with infinite peacetime applications. To date, scores of fantastic devices have been created for war purposes which one day will contribute mightily to the American Way of Life. Weatherhead is producing at the rate of *millions every day* many products that have peacetime application. Just as we've helped build cars, planes and refrigerators in the past, Weatherhead is well prepared to help you build these new products of tomorrow.

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WING TIPS

Physically handicapped workers handle control system for "ice-box" rivets at Curtiss-Wright Columbus plant. Salvage operations reduced 4 per cent. Helldiver production increased as result of program

WARPLANE rivet control system inaugurated by Curtiss-Wright Corp.'s Columbus, O., plant has resulted in a sharp reduction in salvage operations and has increased production of Curtiss Helldivers.

The system is operated by physically handicapped persons hired specifically for the job.

It has cut by 4 per cent the number of rivets that must be reprocessed, a considerable saving in view of the 125,000 rivets installed in each of the Navy dive-bombers before it rolls from the assembly line.

The physically-handicapped persons, many of whom have not been engaged previously in war jobs, sort rivets of 1900 different lengths and sizes, supervise departmental rivet refrigerators and in addition keep workers' individual portable ice boxes supplied with dry ice.

An aircraft riveter in the plant today must report to the physically-handicapped person in charge of his departmental refrigerator and request the type and number of rivets he needs. By the previous method, each worker traveled to a large factory refrigerator and helped himself.

Controlled handling "ice box" rivets has paid big dividends besides giving wartime production jobs to a group of persons who were willing to aid American output if a specialized type of work could be found for them. Hiring of these workers releases skilled employes for more vital jobs.

"Ice box" rivets, heat-treated and then frozen and kept at sub-zero temperatures until used, become hard when exposed to ordinary temperature and are unsuited for driving under rivet guns. By the former method workers used to take a large supply from the plant's main refrigerator, often many times more than actually needed for a certain job. Another fault was the keeping of their individual ice boxes at the proper cold temperature. This resulted in many tons of rivets finding their way into salvage operations where they had to be sorted by hand, heat treated over again and chilled.

The Columbus plant launched an investigation into the problem which concluded its study by placing new workers in control of departmental ice boxes and giving them other assisting jobs to perform along rivet assembly lines. Physically-handicapped workers were selected due to their inability to perform more difficult production tasks calling for skilled workers.

Handicapped by a missing arm, this woman is one of the workers saving tons of rivets for the Columbus, O., Curtiss-Wright plant. Above she is sorting rivets to be heat treated and frozen. Her husband is an employe of the same company. She has a one-year old son who is cared for by a neighbor while she works

Woman aircraft riveter brings her rivet tray to receive a new supply of the frozen parts from a rivet box attendant, crippled by infantile paralysis. Tons of rivets in the aircraft plant are handled by the physically handicapped workers who have aided in speeding output of fighter craft at the Curtiss-Wright plant, Columbus, O.

During their spare time these workers sort rivets which have become hot and hard despite strict precautions. A specially designed sorting table was made with space for 100 or more jars and covered with a flat top containing an equal number of holes marked with the size and number of each rivet. When a jar is filled the worker empties it into a bag which is marked for type and size and sent to the heat-treat department directly.

Several handicapped workers have progressed to better jobs due to the confidence rivet handling has given them, plant officials stated. One, a one-armed woman left her rivet sorting task to become an inspector; a man became a

SUNICUT

Increases Tool Life 20% . . . Produces Better Finish

Prolonging the useful life of tools has become a war-time duty as well as "good business" . . . and a major factor in determining tool life is the cutting lubricant. Many metal working shops have discovered that SUNICUT, the clear, free-flowing oil, not only improves the finish and decreases costs . . . but also adds valuable hours to the life of cutting tools.

In one large New England plant, engaged in vital war production, a change to SUNICUT on their multiple-spindle, automatic screw-machines resulted in an increase of 20% in tool life — helped them get as much work out of every five tools as they previously obtained from six. They secured an average run of 8 hours between tool grindings. Down-time was reduced . . . production was increased . . . and the finish was greatly improved.

Such results, and even better, are not uncommon for plants which have switched to SUNICUT . . . the transparent, sulphurized cutting oil with exceptionally high metal-wetting and heat-absorbing qualities. For proof of what SUNICUT can do in your shop call in a SUN Oil Engineer. Write . . .

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HELPING INDUSTRY HELP AMERICA

Bag of sorted rivets is prepared for delivery to the Curtiss-Wright heat-treating department where they will be reprocessed for use in dive bombers. Worker at left lost his arm in an accident and the one at right has been crippled since birth. Both are part of the plant's new program of "rivet control" which has saved tons of small "ice box" rivets from needless salvage operations

special dispatcher for the plant's flight hangar and another has gone into the radio electric department.

Airplane Production Will Total 115,000 During Year

Testifying before the House Civil Service Committee last week, General H. H. Arnold, commander of the Army Air Forces, disclosed airplane production in the year beginning July 1 is expected to reach 115,000.

This estimate boosts by 15,000 earlier War Department estimates. However, it falls 10,000 planes short of the original objective of 125,000 for the year as disclosed last month during hearings before the House Appropriations Committee on the Army's 1944 supply bill. Army officials explained the revision was caused by changes in design and concentration on heavier types of craft.

General Arnold told the Civil Service group the huge acquisition of aircraft will be accomplished with approximately 36 billion dollars provided for the Air Forces in the Army supply bill. This includes acquisition of spare engines, parts and other equipment necessary to keep planes flying.

The general told the committee the "civilian personnel army" used in field operations must be increased by 56,000 employes to total 386,000 during the year. Today he said there are over two million officers and men in the Army Air Forces, or over forty-two times more than there were three years ago.

By the end of June, 1944, the Army Air Forces will number more than three million, Lieut. Gen. T. McNary, deputy chief of staff, told the Appropriations Committee earlier. In his testimony McNary said the airplane production objective was "approximately 100,000" craft, including 36,000 bombers, 38,000 fighters and 12,000 transports in addition to training and other planes.

"Family Car of the Air" Planned by Cessna

Cessna Aircraft Co., Wichita, Kans., announces plans to turn its manufacturing facilities and skilled manpower to the production of a "Family Car of the Air" immediately after hostilities end.

"This will be an aircraft that the average person can buy and fly and use," contends a company publicity release.

"To be thoroughly usable by the average person," the release continues, the fliver plane "should be practical for both long and short trips. Perhaps the characteristic most important in the public mind is speed. While exact performance records must necessarily remain a trade secret for competitive reasons, engineers believe the minimum practical speed which would make the plane completely usable would be 500 to 600 miles in an afternoon. The range, they agree, must be considerably farther than an auto can travel on a tankful of gasoline.

"Ease of landing is a consideration which most certainly will be taken into consideration by any prospective airplane purchaser. Cessna's mass airplane will be so engineered that landing will be far simpler than maneuvering a sedan into a tight parking space. Controls will be similar to auto controls with a steering wheel which permits the automobile driver to fly very much the way he would drive a car."

Wilson Appoints Aircraft Aluminum Control Committee

Aircraft Aluminum Products Control committee has been appointed by Charles E. Wilson, executive vice chairman, War Production Board.

The committee, charged with the responsibility for increased production of essential aluminum forms and their equitable distribution among aircraft manufacturers, includes the following members: Arthur H. Bunker, director of WPB's Aluminum and Magnesium division, chairman; Harold Boeschenstein, director, Production Controls Bureau, WPB; Brig. Gen. F. M. Hopkins, Army; Capt. Don Rice, Navy; T. B. Wright, director, Aircraft Resources Control office; Frank Russell, National Aircraft War Production Council. Hugh Wilder, representing the Aluminum Co. of America, will be on call for committee meetings.

Spend $19,339,000,000 on Industrial War Facilities

Value of war industrial facilities financed with public and private funds, which include all projects for which contracts had been let since June, 1940, reached $19,339,000,000 by the end of March, the War Production Board reports.

A total of $15,140,000,000 of it was financed by government funds and the remainder of $4,199,000,000 was financed privately. Less than 5 per cent of the $5,000,000,000 spent on ordnance, including guns, ammunition, and explosives, was financed with private funds. This group represents 26 per cent of all facility expansion. Next was aircraft with a total of $3,327,000,000, representing 17 per cent of the total cost of war facilities.

New Aluminum Sheet Mill Operating at Chicago

Thirteen months after the ground had been broken for the Chicago works of the Aluminum Co. of America, reportedly the second largest aluminum sheet mill in the world, the plant went into operation.

The plant, designed primarily to produce alloy aluminum sheets will also produce special alloy ingots for shipment to other plants making forgings and extrusions. Rolling mills are reportedly capable of rolling aluminum sheets 50 times as fast as before the war. One building covers 55 acres.

2. 4. 5. 6. 7. 8.

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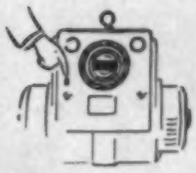
YOUR CHOICE OF AN ARC WELDER"

Consider Multi-Range Dual Control, the secret of Hobart's operating simplicity, and just one of the reasons for its extra speed. Quickly, easily, you select any one of a thousand combinations to get the exact "heat" you need . . . and you weld away from the machine with complete assurance of maintaining that exactness with fingertip Remote Control. Hobart Welders are quality built, right from the strong central shaft on out. There's no skimping on any part, no attempt to "get by." Owners have found this the basic reason for Hobart's long life and ability to "take it" through hours, days and years of operation. Designed to operate on a sensible R.P.M. adds considerably to long life and cuts operating costs to the bone. Cool operation is assured through special two-way cooling. No wonder then, that a list of Hobart users reads like a Who's Who, and their success with Hobart has helped many of them to the top.



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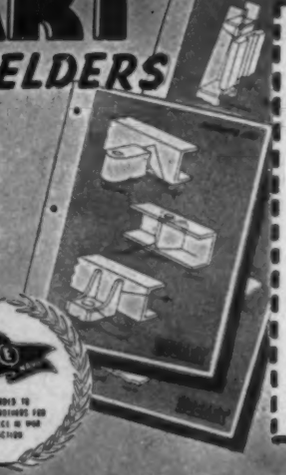

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OLIVER W. BONNAFE

C. B. COOK

John E. Mateer has been appointed superintendent, open hearth department, Lukens Steel Co., Coatesville, Pa., to succeed **Herman J. Hofmann** resigned from active duty because of ill health but who continues in an advisory capacity. Associated with Lukens for 36 years, Mr. Mateer was made assistant superintendent of the open hearth department in 1940. Mr. Hofmann joined Lukens Steel Co. in 1926.

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J. W. Hennen, New Orleans assistant division manager, Consolidated Vultee Aircraft Corp., has been named new Nashville division manager. He succeeds **Robert McCulloch,** division manager, resigned. Mr. Hennen, previously associated with Boeing Aircraft Co. as production chief of the Seattle plant, joined Consolidated Vultee in 1939 as production manager of Vultee Field, Calif. division.

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David F. Austin, who has been consultant to the chief of the Iron and Steel branch, WPB, since February, 1942, has resigned to resume his duties as vice president of Carnegie-Illinois Steel Corp., Pittsburgh.

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R. H. Sonneborn has been appointed sales director of Chicago Nipple Mfg. Co., Chicago.

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J. L. Mauthe has been appointed operating vice president, Youngstown Sheet & Tube Co., Youngstown, O., to succeed the late William B. Gillies, who died June 20.

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J. A. Petrick, former cost department supervisor, has been named personnel manager, Kellogg Switchboard & Supply Co., Chicago. Mr. Petrick has been associated with the company 26 years.

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Martel H. Brett, former member of the editorial staff, *Birmingham Age-Herald*, has been named acting assistant to **Ernest D. LeMay,** director of public relations, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala. Mr. Brett succeeds **Randolph Fort,** who recently joined the field staff of the American Red Cross.

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Roy W. Paton, replacement engineer since 1941, Perfect Circle Co., Hagerstown, Ind., has been elected chairman of the Indiana section of the Society of Automotive Engineers for the year 1943-44.

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James G. Gammel, former industrial brush representative, Osborn Mfg. Co., New England territory, has been appointed technical assistant in brush engineering service at Osborn's home office and factory, Cleveland. Mr. Gammel assists **G. O. Rowland,** who is chief of WPB's Industrial Brush unit.

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David MacGregor has been appointed chief engineer, Edward Valve & Mfg. Co. Inc., East Chicago, Ind.

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James D. Baughan has been appointed executive assistant to the president, D. W. Fraser, American Locomotive Co., New York. Mr. Baughan became associated with the company in 1937 as assistant to the president, **William C. Dickerman,** who is now chairman of the board.

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Walter Carroll, Republic Steel Corp.'s metallurgical department, Cleveland, has been appointed to the Steel Division, War Production Board, Washington. He has charge of Lend-lease aid to Russia.

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Walter C. Smart has become service manager, Twin Coach Co., Kent, O., succeeding **Willim L. Davis,** resigned because of ill health.

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H. B. Hodgins, application engineer, Westinghouse Electric & Mfg. Co. in Spokane, Wash., area since 1935, has been named manager of the company's Spokane office.

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Oliver W. Bonnafe, research engineer, Lapointe Machine Tool Co., Hudson, Mass., has been awarded the National Metal Trades Association medal for his invention of the automatic broach rifling machine.

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C. B. Cook has been appointed vice president in charge of advertising, sales promotion and export sales, Elwell-Parker Electric Co., Cleveland. Mr. Cook became affiliated with the Elwell-Parker Co. in 1914, when he organized its sales-promotion department. He also laid the foundation for the company's export activities.

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George M. Muschamp and **Paul L. Goldstrohm** have been appointed vice presidents, Brown Instrument Co., Philadelphia, subsidiary of Minneapolis-Honeywell Regulator Co., Minneapolis. Mr. Muschamp will be vice president in charge of engineering, and Mr. Goldstrohm, vice president in charge of production.

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G. C. Hoyt, director of foreign sales, International Harvester Co., Chicago, has been elected vice president in charge of foreign sales. Mr. Hoyt succeeds **E. A. Brittenham,** who has retired after more than 41 years with the company.

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H. A. Thorndike, manager, H. D. Hudson Mfg. Co., Oshkosh, Wis., has resigned to devote full attention to March Engineering Co. of that city which he organized about a year ago. **H. D. Youngburg** has succeeded Mr. Thorndike as manager at Hudson Mfg. Co.

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Carl Schreyer, war purchasing expe-

diter, Bell & Howell Co., Chicago, has been appointed general purchasing agent. Mr. Schreyer joined the company eight years ago.

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Harry M. Wood, former superintendent, Logansport division, Pennsylvania railroad, has been named general superintendent of motive power, Western region, with headquarters in Chicago, succeeding **William Y. Cherry,** who retired after 56 years of service. **Morton S. Smith,** division engineer, Long Island railroad, has succeeded Mr. Wood. **George S. Webb,** master mechanic, Chicago Terminal and Logansport divisions, had been appointed superintendent of motive power of the Southern division of Pennsylvania railroad.

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Paul G. Hoffman, president, Studebaker Corp., South Bend, Ind., has been elected to the board of United Air Lines Transport Corp., Chicago.

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J. M. Zimmer, for the past several years chief engineer, Edward Katzinger Co., Chicago, has been appointed vice president.

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Edward J. Nunan, sales engineer, Buffalo Slag Co., Buffalo, has been elected president of the Erie County chapter of the New York State Society of Professional Engineers.

J. L. TRECKER

Who has been appointed executive vice president, Kearney & Trecker Corp., Milwaukee, Wis., as announced in STEEL, June 7, p. 93

T. W. HOWARD

Who has been appointed superintendent of turbine and marine installations, General Electric Co., Schenectady, N. Y., as announced in STEEL, June 28, p. 75.

OBITUARIES . . .

EARLE D. PARKER

Earle D. Parker, 63, vice president and general works manager, Barber-Colman Co., Rockford, Ill., died June 12 near Durand, Ill. An expert in his field and active for years in the National Association of Machine Tool Builders, Mr. Parker was a member of the board of directors of the Metal Cutting Tool Institute, director of Machinery and Allied Products Institute, and a member of the advisory committee on metal cutting tools of WPB.

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Gilbert A. Young, 71, former head of the school of mechanical engineering, Purdue University, West Lafayette, Ind., died June 27 in Pontiac, Mich. Dr. Young was an authority on locomotives and fire hazards.

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Stanley E. Coulter, 90, for 39 years dean of science, Purdue University, West Lafayette, Ind., and emeritus dean of men since his retirement in 1926, died June 26 in LaFayette, Ind. Known to thousands of students as "the grand old man of Purdue", Dr. Coulter had been closely identified with the development of Purdue from a minor school to a large university.

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Alfred F. Harris, 83, chairman of the board, Harris-Seybold-Potter Co., Cleveland, and pioneer in development of the offset lithographic press, died June 26 in that city.

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Joseph S. Ames, 78, president emeritus of Johns Hopkins University, and one of the nation's foremost experts on aerodynamics, died June 24 in Baltimore. Serving for 25 years as a member of the National Advisory Committee for Aeronautics, Dr. Ames contributed greatly to the improvement in efficiency and safety of aircraft.

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Frederick Payne Weston, 73, retired president, Torrington Co., Torrington, Conn., died June 24 in that city.

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William E. Sykes, inventor of the Sykes continuous tooth herringbone gear and the Sykes gear generating machine, died June 19 in England. He had operated his own company, W. E. Sykes Ltd., in England and formerly was associated with Farrel-Birmingham Co.

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David E. Ross, 71, chairman, Ross Gear & Tool Co., LaFayette, Ind., and inventor of the Ross steering gear, died in that city June 28. Mr. Ross was also president of the board of trustees, Purdue University, West Lafayette, Ind.

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G. K. Abbott, president, Abbott Ball Co., Hartford, Conn., died June 13.

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James Seymour, 78, designer and builder of steam engines, and a member of the advisory board appointed by the Nova Scotia government to develop diesel engines for submarine propulsion, died June 27 in New York. Mr. Seymour was a founder of McIntosh & Seymour Corp., Auburn, N. Y., which in 1929 merged with the American Locomotive Co., New York.

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Howard Jones, 47, vice president in charge of production, White Motor Co., Cleveland, died June 27 in that city. Elected a vice president of the company last March, Mr. Jones had been with White Motor Co. for nearly 20 years.

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William R. Day, 72, president for 23 years, Day Piston Co., Cleveland, died recently.

Fill Breach As Iron Ore Analysts

Special training provides them with necessary background for replacing inducted men in laboratories. Manifold duties important factor in defense effort

SHORTAGE of manpower on Minnesota's famous Mesabi iron ore range has necessitated employment of women as analysts in ore laboratories and upon their efforts depends the accurate grading of iron ore cargoes for the steel producing facilities of the nation. In view of the vital sale of ore the importance of the work performed by these women analysts is obvious.

During the 1942 season the Hibbing laboratory of the Oliver Iron Mining Co., United States Steel subsidiary, employed a force of 65 chemists and analysts. At the opening of this season not more than 34 of these men were available.

In the fall of 1942, it became evident to officials of the company that there would not be a sufficient number of men available for laboratory employment during the 1943 ore shipping season. Company officials then decided to train women in the laboratory as replacements for these men.

Through the co-operation of the Junior College at Hibbing, Minn., and the Chisholm high school, Chisholm, Minn., two training courses in laboratory manipulations were offered to women. From the members of these four classes, the company drew most of the women now employed in their laboratory.

First group of these trainees consisted of 24 women, most of them young married women whose husbands had either gone into the Army or expected to be called into service soon. Some of these women are college graduates, others have had college training in home economics or medical technology and all had some courses in chemistry previous to the refresher course in laboratory manipulations last winter.

For several weeks prior to the opening of the ore shipping season the trainees were employed on short shifts to accustom them to procedures and to receive instructions as to their laboratory duties in the chemical analysis of iron ore.

Duties of making determinations of iron, manganese, phosphorus, neutralizing samples of iron ore for aluminum and manganese determinations, filtering, removing residue from beakers, burning filter paper from silica, and taking dust count, fall to these women. Their work is proving invaluable in the national defense effort in an industry which was seriously threatened by the shortage of trained men.

WOMEN AT WORK:—Serving as analysts and laboratory technicians in the laboratories of the Oliver Iron Mining Co., women are relieving the critical manpower shortage. Mrs. Vivian Steinbrecher, Hibbing, Minn., is shown above completing a manganese determination. Other laboratory work performed by women include neutralizing of samples for alumina determination, filtering and washing residue from test beakers, neutralizing phosphorus, taking dust count, etc.

Women Prove Invaluable On Precision Tool Work

Women have established themselves as exceptionally well qualified to perform precision work in the production of cutting tools, Archer & Smith Ltd., Lexington, Ky., report. They have provided the means for overcoming manpower shortage during the war period.

The firm is one of the pioneers in the application of the policy of employing women for production of cutting tools. Company officials conceived the idea after watching women at work in various plants and industries, noticing their hands and fingers operating intricate machines as used in the textile field, and doing most exacting work.

When the plant was established in Lexington, key men from the Detroit plant organized training courses to assure the specialized skill required of every employe. Practically all the operating employes are women.

Critical Shortage of Engineers Developing

Thousands of engineers now employed on jobs not essential to prosecution of the war, must transfer before year's end to more essential activities where a shortage of qualified engineers that threatens to become acute is developing. This was revealed in a report to Paul V. McNutt, chairman, War Manpower Commission, made by National Roster of Scientific and Specialized Personnel of the commission's Bureau of Placement.

It is indicated there should be an increase during 1943 from 40,000 to 50,000 in total number of engineers in essential civilian work and in the armed forces.

It is estimated that at present there are about 280,000 American professional engineers, of whom 19 per cent are in the armed forces and in civilian jobs in the War and Navy Departments. Twelve per cent are in other governmental positions; 49 per cent are employed in manufacturing, mining and construction; while 20 per cent are employed in transportation, communication, public utilities, private consulting offices, colleges and universities.

Tool Builders Tell House Group of Injustices Under the Present Act

Procedure described as dangerous. . . Earnings permitted toolmakers held too low in view of risk and extreme fluctuations in demand necessitating setting up of reserves in good years to carry on in poor ones

DEBATE that undoubtedly will have some bearing upon changes and amendments to be made in the Contracts Renegotiation act occurred before a subcommittee of the House Committee on Naval Affairs on June 25.

Two leading machine tool builders complained about injustices to the machine tool industry under the present law and renegotiation procedure. On the other hand, the vice chairman of the War Department Price Adjustment Board held that careful study proves that the machine tool industry has earned excessive profits in the war program and that renegotiation is desirable.

Ralph E. Flanders, president, Jones & Lamson Machine Co., and president, Bryant Chucking Grinder Co., both of Springfield, Vt., said renegotiation of the contracts held by these companies now has been completed. While asking no relief for his companies, Mr. Flanders said the experience revealed the renegotiation procedure as dangerous. Thirty-three companies making machine tools and allied products such as forging machines, presses, shears, brakes, cutting tools and gages have been renegotiated.

Twenty-five Per Cent Not Enough

"The earnings permitted this group are said to be 25 per cent higher than those permitted on the average to all other companies that have been renegotiated. I submit," declared Mr. Flanders, "that it is obvious that an allowance only 25 per cent higher does not reflect the ratio of risk between the machine tool builders and other industries.

"We must also bear in mind that in many cases not yet settled the boards have asked for the return of sums that will leave these builders of machine tools with meager returns indeed. If these cases are settled in line with the wishes of the board, there will be an even smaller margin for machine tool builders over others."

Mr. Flanders presented data showing the extreme fluctuations in demand that characterize the machine tool business, with the necessity of setting up reserves in good years to cover poor ones.

"After the war there should be no depression," he continued. "No doubt the accumulated demand for consumer goods will keep many of our industries going at an unprecedented rate over a long period of time. However, the machine tool builder will be 'enjoying' a long and serious depression of his own. This depression will bear with especial severity on the relatively small companies which did not succeed in showing a profit until 1936 or 1937 and who have correspondingly little reserve strength with which to face the future depression."

GIVE BOTH SIDES

Sharply opposing views with respect to contract renegotiation, both as a policy and as regards procedure, were voiced at the recent hearing on the subject by a subcommittee of the House Naval Affairs Committee. In the accompanying article the views of two leading machine tool interests are presented. STEEL, in its issue of July 12, will present the position of the War Department Price Adjustment Board as indicated in a statement by Herbert J. Taylor, vice chairman of the board, on machine tool industry profits, read before the House committee.—The editors.

It is imperative, he said, to remove conditions that would make it impossible for the machine tool industry to play its proper part in the future development of American industries. Allowance should be made for reasonable reserves for future expenses, adjustments, costs and losses which may reasonably be expected to result from and be attributable to the contractor's or subcontractor's war production.

Joseph L. Trecker, executive vice president, Kearney & Trecker Corp., Milwaukee, declared that if the price adjustment boards renegotiated the profits on this company's $43,788,000 sales for 1942 in the light of the directive issued by the War and Navy departments, "then we might be allowed a net income of only $382,000, which profit is less than 1 per cent of those sales. The results would be disastrous."

Mr. Trecker recommended amendments to the Contracts Renegotiation law "to clearly set forth the purpose, extent and scope so as to make it unnecessary for the administration departments to assume such broad powers of interpretation as are now necessary, and which may produce results which will seriously jeopardize the postwar financial stability of certain business groups."

The renegotiation theory, said Mr. Trecker, does not meet with serious objection from manufacturers of expendible war supplies whose regular business of manufacturing consumer goods for civilian consumption has been suspended for the duration, but who will be able to sell their peacetime production to a hungry market. On the other hand, manufacturers of durable goods and equipment who have flooded their afterwar markets by the present over-production of their regular, peacetime products "cry out at the injustice of the present law and beg for relief".

Results for One Year No Criterion

Mr. Trecker's testimony is worthy of some detailed treatment for the reason that his attitude is so generally prevalent in the machine tool industry. While the Kearney & Trecker Co. dates back to 1898, it was not incorporated until 1920. Since then and to and including 1937 it produced machine tools approximately 50 per cent of the value of what it produced in the single year of 1942. Five of these years brought profits, four practically broke even. The losses of the remaining eight years exceeded the profits of the five profitable years by approximately $800,000. The stockholders did not receive any return on their investment which, Dec. 31, 1937, was approximately $2,900,000. Average total compensation to the officers who held this $2,900,000 investment was about $22,000 a year.

"A machine tool business," explained Mr. Trecker, "cannot possibly afford to be renegotiated under the application of an amended law on the basis of results of any one year. A cycle of years, both good and bad years, must be provided for in the amended law for the renegotiation of profits if the machine tool builder is to survive."

Expressing the belief that the greater part of any so-called excess profits in 1942 has been repaid to the government through the application of the excess profits tax, Mr. Trecker criticized the excess profits tax law with failing to give consideration to the fact that ma-

chine tools built in 1942 represent actually what otherwise would be sales over a period of not less than 12 years ahead. The excess profits tax, he pointed out, is based on a single year's shipments.

"Because of this fact", he continued, "I believe that manufacturers who like ourselves are producing their regular line of durable goods have been relieved of all excess profits by application of the tax law.

"While current assets of this company at Dec. 31, 1942, are approximately eleven times those of Dec. 31, 1936, current liabilities are in excess forty times. Ratio of assets to liabilities decreased from 5 to 1 at the end of 1939 to about 1.4 to 1 at Dec. 31, 1942. Amount of working capital increased five times but the amount of inventories increased seven times.

"Net result is that present working capital is only one-seventh of the current working capital at Dec. 31, 1939. To make any further refund of so-called excess profits for the year 1942 would seriously impair the financial position of the company."

Mr. Trecker suggested revision of the Contracts Renegotiation law so that profit of a contractor found to be excessive for any one year be repaid by the contractor to the government in annual installments based on the life of the machine tools consumed in the production of war materiel.

"By this I mean that if machine tools have a life of 13 years (the figure of the American Appraisal Co.), and that the present emergency is over as of Dec. 31, 1945, then four years of the useful life of the machine tools sold in 1942 will have been consumed in the production of war materiel. Then the contractor will refund yearly one-thirteenth in each of those four years of the profits previously found to be excessive on his expanded war sales for 1942. Similar treatment should be accorded sales of 1943."

Mr. Trecker also offered an amendment that unamortized cost of plant facilities as of Dec. 31, 1941, together with cost of such facilities purchased in 1942 under certificates of necessity, be allowed as a deduction in determining the amount of excess profits on expanded sales for 1942, and further that the cost of such facilities acquired after 1942 be allowed as a deduction in the current year in determining the amount of excess profits on sales for such year.

New Industry Advisory Committees Organized

Director of Industry Advisory Committees, War Production Board, announces the formation of the following industry advisory committees during the past week:

Used Electrical Equipment Dealers

Government Presiding Officer is W. G. Turquand. Committee members are:

L. S. Belyea, vice president, Belyea Co. Inc., Jersey City, N. J.; Edward A. Camp, treasurer, Central Armature Works Inc., Washington; W. W. Hanks, president, Southern Electric Service Co. Inc., Charlotte, N. C.; Charles B. Kaska, president, Chicago Electric Co., Chicago; George Sachsenmaier, partner, Keystone Power Plant Equipment Co., Holmesburg, Philadelphia; E. C. Steijen, president, Koeneman Electric Co., Jackson, Miss.; J. Roland Stolzenbach, president, Roland Electrical Co., Baltimore; F. W. Willey, partner, Willey-Wray Electric Co., Cincinnati; and J. N. Pilmer, president, Electric Engineering Construction Co., Des Moines, Iowa.

Used Equip ent and Machinery

Government presiding officer—W. G. Turquand. Committee members: Fred R. Firstenberg, First Machinery Corp., New York; George D. Flynn Jr., Providence, R. I.; Max Grimes, president, Morse Bros. Machinery Co., Denver; J. Lee Hackett, J. Lee Hackett Machinery Co., Detroit; R. A. Hughes, purchasing agent, Industrial Equipment Co., Emeryville, Calif.; Albert M. Kahn, president, Consolidated Products Co., Inc., New York; Erwin E. Newman, president, Newman Tallow & Soap Machinery Co., Chicago; Morris Speizman, Charlotte, N. C.; R. A. Vine, Detroit; F. W. Willey, partner, Willey-Wray Electric Co., Cincinnati.

Frog And Switch

Government presiding officer is George C. Bruner. Committee members: T. E. Akers, vice president, Ramapo Ajax division, Niagara Falls, N. Y.; John E. Conley, president, Conley Frog & Switch Co., Memphis, Tenn.; L. E. Connelly, president, Cleveland Frog & Crossing Co., Cleveland; Ralph G. Detmer, manager, American Frog & Switch Co., Hamilton, O.; W. A. Enstrom, general sales mgr., Pettibone-Mulliken Corp., Chicago; W. H. Friedline, manager of sales, Carnegie-Illinois Steel Corp., Johnstown, Pa.; R. L. Gillispie, manager of sales, Bethlehem Steel Co., Bethlehem, Pa.; W. Homer Hartz, president, Morden Frog & Crossing Works, Chicago; J. A. Krugler, vice president, Taylor Wharton Iron & Steel Co., Easton, Pa.; O. DeGray Vanderbilt Jr., president, Weir Kilby Corp., Cincinnati; L. E. Weidman, vice president, Frog, Switch & Mfg. Co., Carlisle, Pa.

War Agency Appointments, Resignations Announced

M. B. Garber has been appointed director of the Construction Machinery Division of War Production Board. He has been acting director of the Division since April 3, 1943.

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Truman P. Handy has been appointed deputy chairman of the Smaller War Plants Corp. Mr. Handy has been serving as deputy director of the Consumer Goods Bureau of the War Production Board since last November. Prior to that he was chairman of the board of the Celluloid Corp. and sales manager of its parent company, the Celanese Corp. of America.

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Austin C. Hoffman has resigned as acting deputy administrator, Office of Price Administration. Donald Wallace has been appointed the "sole acting deputy administrator for price" while R. B. Hefflebower, who continues as director of the Food Price Division, has charge of the food price control program. Kenneth W. Rowe, executive officer for price, will aid Mr. Wallace in the general supervision of the program.

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Lester V. Chandler has been appointed price executive of OPA's rubber price branch to fill a post made vacant several months ago by the resignation of Robert F. Bryan.

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John C. Whitridge Jr. has been appointed director, Office of Industry Advisory Committees, WPB succeeding Barry T. Leithead who is returning to Cluett, Peabody & Co. as eastern director of sales. Mr. Whitridge formerly was Eastern division sales manager of International Business Machine Co.

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Wendell Lund has resigned as director of Labor Production Division, War Production Board.

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Nathaniel Leverone, WPB salvage director in Illinois, his assistant Ben Regan, executive secretary, general salvage branch, and J. Chancellor Dougall, in charge of the tin salvage program for Illinois, WPB, all located in Chicago, have resigned, effective July 1. Mr. Leverone has served WPB 18 months without pay.

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Phillips R. Turnbull has been appointed regional director of WPB for Region 2, which embraces metropolitan New York, to succeed John P. Maguire. Mr. Maguire is resuming active management of his business in the textile field.

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Theodore K. Quinn of New York has been appointed Director General of War Production Drive. He has been granted a leave of absence from his position as president of Maxon Inc., advertising agency.

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George O. Rowland has been appointed chief of the War Production Board's new industrial brush unit. He is an executive of the Osborn Mfg. Co., Cleveland.

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Arthur A. Adams has been appointed Chicago regional manager, Section of Tank Car Service, Office of Defense Transportation's Division of Petroleum and Other Liquid Transport.

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John A. Clarke has been appointed senior motor transportation expediter, Division of Motor Transport, Office of Defense Transportation. Charles E. Miller has been appointed senior transportation assistant for the Division.

Twenty year veterans were presented special service certificates and gifts of $100 War Bonds at the Army-Navy "E" award to Youngstown Pressed Steel, division of Mullins Mfg. Corp., Warren, O. George E. Whitlock, Mullins' president, spoke at the ceremony

Edward G. Budd, founder and president, Edward G. Budd Mfg. Co., Philadelphia, receives (below at the left) from Howard McCutcheon, president, Student Council of Murrell Dobbins Vocational School, the school's first award to a "Pioneer of Industry"

North African war veteran, Corp. John M. Moore, talks shop with a hammer driver at the Army-Navy "E" award ceremony of the Latrobe, Pa., plant of the American Locomotive Co.

Metalworking Companies Cited by Armed Services

Outstanding performances on war contracts won the joint Army-Navy "E" awards last week for the following companies:

Accurate Steel Treating Co., Chicago.
Advance Stamping Co., Detroit.
F. W. Berk & Co. Inc., Wood Ridge, N. J.
Blaw-Knox Co., Blawnox, Pa.
Christensen Machine Co., Salt Lake City, Utah.
Felker Mfg. Co., Torrance, Calif.
Fisher Governor Co., Marshalltown, Ia.
William D. Gibson Co., Division of Associated Spring Corp., Chicago.
A. C. Gilbert Co., New Haven, Conn.
Graham Paige Motors Corp., Detroit.
Hercules Powder Co., Belvidere, N. J.
A. F. Jorss Iron Works Inc., Washington.
J. O. Mfg. Co., South Gate, Calif.
J. A. Maurer Inc., New York.
Pettibone Mulliken Corp., Chicago.
Westinghouse Electric & Mfg. Co., Meter Division, Newark, N. J.

Dominion's Steelmaking Capacity Doubled Since Outbreak of War

Now exceeded as steel producer among United Nations only by United States, Russia and Britain. . . Domestic mills to supply upward of 3,000,000 of the 5,000,000 tons required in the country during current year

CANADA'S steel requirements for the current year will total approximately 5,000,000 tons, of which Canadian mills will supply upward of 3,000,000 tons, states C. D. Howe, minister of munitions and supply. Due to substantial increase in domestic steel production, Canada is now in a position to provide almost two-thirds of its total requirements, which leaves only one-third to be supplied by the United States. Formerly imports of better than 50 per cent were required from the States.

Mr. Howe stated: "Canadian steel production has been doubled since the outbreak of war, and this country now is exceeded as a steel producer among the United Nations only by the United States, Russia and Great Britain.

"Because of the great increase in productive capacity and because of rigid curtailment policies, we have succeeded in meeting our heavy obligations. At no time has there been a serious interruption in the operations of a munitions plant or a vital industry owing to lack of steel. Despite an enormous increase in our requirements, we are now dependent upon the United States for only one-third instead of nearly half of our supply. The production of alloy steels is nearly five times as great as in 1939.

Ingot Output Increases

"In 1939 our output of steel ingots was less than 1,500,000 tons; in 1940 just over 2,000,000 tons; in 1941 slightly better than 2,500,000 tons; in 1942 almost 3,000,000 tons and at the end of 1943 we will be producing at a rate of more than 3,000,000 tons a year.

"New rolling and finishing mills of the most modern type have been installed, equipped and are in operation. Two new plate mills have helped to increase production of plate to nearly 300,000 tons more in 1942 than in 1939. Most of this has gone into building cargo and fighting ships. Shell steel is now established at about 250,000 tons a year and we are using over 500,000 tons of steel a year for production of tanks and other army vehicles.

"Steel foundry capacity also has been expanded. Production of castings has been increased from 61,000 tons in 1939 to 160,000 tons. These castings are used in a great variety of munitions from huge stern frames for cargo ships to parts for small arms. We have built the two largest blast furnaces in the British Empire. One is nearing completion, and it is expected that during the summer pig iron production will be established at a rate of more than 2,500,000 tons a year, which is almost four times greater than at the outbreak of war."

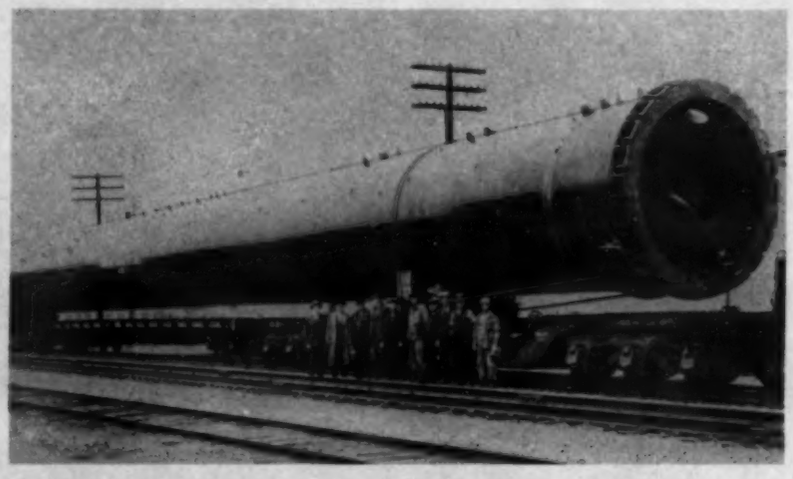
"Only about 30 per cent of Canada's war production is being delivered to Canadian armed forces at home and abroad," Mr. C. D. Howe reports.

"The remainder goes to Britain, the United States, India, Africa, China, Australia, New Zealand and the South Pacific.

"Canada has shipped to the United States war materials such as components of various munitions, ammunition, secret electrical devices and base metals. More than 80 per cent of Canadian output of automotive transport has gone to Britain, Egypt, India, the Middle East, Near East and the Far East, Australia and New Zealand. To the Empire, Africa, Australia and New Zealand, have been shipped armored cars, guns, heavy ammunition, small arms, anti-aircraft guns, bombs, anti-tank mines, and small arms ammunition. Canadian plants have started manufacture of 145 military locomotives for India. Canadian rifles are in use in Africa, Iraq, New Zealand, Australia, India, and many other places. Canadian-made aircraft have long been in combat service and Canadian-made machine guns have been blasting German, Italian and Japanese planes.

"Canada has sent to Russia more than 1400 Canadian tanks, more than 2000 universal carriers, naval guns, Bren guns and anti-tank guns. Also, we have provided Russia with ammunition for heavy guns and small arms. In addition shipments to Russia include machine tools, personal equipment, clothing, as well as five metals most urgently required for the war program. We expect to ship to various combat zones, many additional types of equipment, now that the Mutual Aid Board is operating.

"Our general purchasing branch, handling most of the supplies required for our Army, Navy and Air Corps, constitutes the biggest single market for hundreds of Canadian manufacturing plants. Orders placed by the division now total $2,500,000,000. Its purchases range from pins to locomotives. It also buys raw materials for finished products. There has been set up in Edmonton, a Crown company, North-West Purchasing Ltd., which will handle all purchases in Canada for the Alcan and Canol projects and for the various military operations in the Yukon and Alaska."



RECORD SHIPMENT: Huge tank for a synthetic rubber plant is the largest single freight unit ever carried over the Canadian National railways. Manufactured by the Dominion Bridge Co., the tank is 165 feet long, 12½ feet in diameter, weighs 150 tons. Acme photo

Chicago War Plants

Continue to expand with additional DPC commitments totaling $15,000,000

CHIEF contribution to plant expansion figures for the Chicago area during June consisted of added commitments by Defense Plant Corp. for large industrial plant facilities already under construction.

According to the industrial department, Chicago Association of Commerce, these added commitments, totaling $15,000,000, represent upward revisions of construction and equipment costs.

Remainder of the month's activity covered expansion of 16 of Chicago's old-line metalworking firms having been required to enlarge facilities on account of direct or indirect war orders. Also one of Chicago's new war plants is engaged in a substantial extension of working space, the second such expansion since original construction.

Inclusive of added construction cost, based on re-estimates above original DPC commitments, total industrial activity for June yielded a figure of $20,615,000, bringing to a total of $83,889,937 the expenditures for new plants and expansions for the first half of the year.

Investment in new plants and equipment in the Chicago area since the beginning of the defense program in 1940 has reached a total of $902,544,937.

Production Increasing at American Central Mfg. Co.

Production at American Central Mfg. Corp., Connersville, Ind., is increasing monthly with the prospect that by November shipments will be double the rate for the corresponding month a year ago, Saunders P. Jones, president, reports.

Additional contracts for jeeps and trailer bodies are expected to keep one division of the plant working at top speed for about 12 months. The company is steadily expanding facilities for the production of exhaust manifolds, outer wings, turret decks, decks over wings and other parts for bombers.

Bridge Construction Seen Postwar Steel Stimulant

Bridge construction and repair are foreseen as leading postwar stimulants to the steel industry and major employment mediums for thousands of fighting men returned from the fronts by Walter E. Irving, president, Irving Subway Grating Co., Long Island City, N. Y.

Basing his estimate on the fact an enormous "backlog" of railroad and highway bridge work is being set up, Mr. Irving points out that the war suddenly interrupted bridge improvements.

Some of the important spans already surfaced in the safety steel "lacework," he pointed out, are the University Bridge, Seattle, first installation of its kind in the world; the Marine Parkway Bridge, Brooklyn; Charlestown Bridge, Boston; Mid-town Tunnel approach, New York; Driving Park Bridge, Rochester, and the Missouri-Sioux City Bridge.

BRIEFS . . .

H. G. Irwin Lumber Co., Garland, Pa., has discontinued the use of the trade name in reference to Durock Hammer Boards. Use of the trade names Durock and Silveroc will be continued.

—o—

Walker Electric Supply Co., Terre Haute, Ind., has been made a distributor of Allis-Chalmers welding equipment in the territory of western Indiana and eastern Illinois.

—o—

W. B. Lawson Inc., Cleveland, announces it is a distributor of Merck Reagent chemicals and acids.

—o—

Williams Gauge Co., Pittsburgh, manufacturer of power plant equipment, announce appointment of William H. Saylor and H. E. Barsford of the Specialty Sales Co. as its representatives in the Salt Lake city territory.

—o—

Smith, Hinchman, & Grylls Inc., industrial engineers, Detroit, announces expansion of their tool engineering division.

—o—

C. A. Olsen Co., manufacturers of warm air furnaces and air conditioners, Elyria, O., recently purchased the Henry Furnace & Foundry Co. plant at Medina, O.

—o—

Pittsburgh-Des Moines Steel Co. will erect a high-pressure wind tunnel costing about $2,000,000 on the grounds of Ames Aeronautical Laboratory.

—o—

Cardox Corp., Monee, Ill., has made alterations and additions to the new plant constructed here two years ago.

—o—

Domestic Industries Inc., Chicago, has acquired control of the Service Caster & Truck Co., Albion, Mich. Service Truck & Caster Co., Somerville, Mass., was included in the acquisition.

—o—

Mid-States Equipment Co., Joliet, Ill., manufacturer of electric arc welding equipment and portable power saws, has purchased a three-story building at 2429 South Michigan avenue, Chicago, to which executive offices will be moved.

—o—

Highway Steel Products Co., Chicago Heights, Ill., recently expanded its operating facilities.

—o—

Industrial Truck Service, Chicago, specializing exclusively in rebuilding and reservicing of industrial trucks and power lift trucks, recently doubled its capacity.

—o—

The York Ice Machinery Corp., York, Pa., announces it will be known hereafter as the York Corp. as a result of final court approval on a plan of merger and recapitalization.

—o—

Elastic Stop Nut Corp. has purchased the plant of the Massey Concrete Products Co., Newark, N. J.

—o—

A. B. de Sanno & Son Inc., Phoenixville, Pa., announce opening of Philadelphia offices for its machine sales division and export department.

—o—

Kellett Autogiro Corp., Upper Darby, Pa., has reassumed the name of Kellett Aircraft Corp.

—o—

Lindsay & Lindsay, Chicago, announce purchase of a plant at 4818-4833 S. Rockwell street, Chicago.

—o—

H. K. Porter Co. Inc., Pittsburgh, announces purchase of Quimby Pump Co.'s plants at Newark and New Brunswick, N. J.

Industrial Advertisers Elect New Officers

Frederic I. Lackens, advertising manager, Hays Corp., Michigan City, Ind., was elected president of the National Industrial Advertisers Association Inc. at the annual election of officers held in conjunction with the central regional wartime conference at Hotel Statler, Cleveland, June 25.

Vice presidents elected were:

Alan Ballantyne, Novo Engine Co., Lansing, Mich.; Walter A. Bowe, Carrier Corp., Syracuse, N. Y.; Wilmer H. Cordes, American Steel & Wire Co., Cleveland; Edward V. Creagh, American Chain & Cable Co. Inc., Bridgeport, Conn.; John Galilee, Canadian Westinghouse Co. Ltd., Hamilton, Ont.; John H. Kunkel, Fluor Corp., Los Angeles; J. M. McKibben, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.; Graham Rohrer, Baldwin-Hill Co., Trenton, N. J. Arnold Andrews, Bucyrus-Erie Co., South Milwaukee, Wis., continues as secretary-treasurer.

THE BUSINESS TREND

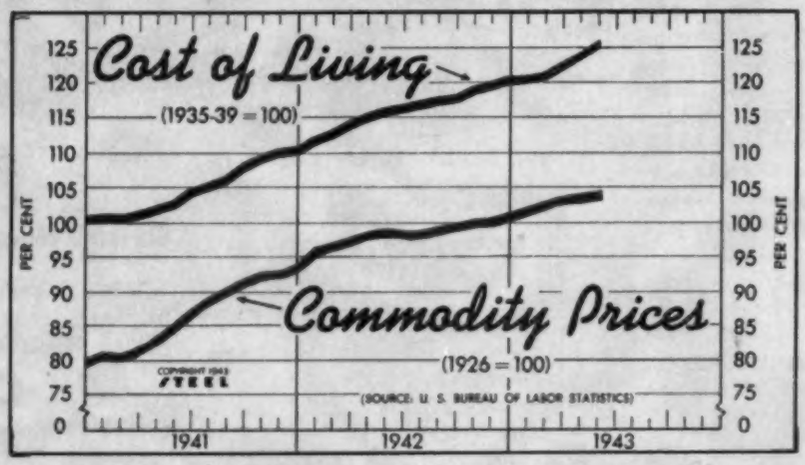
War Production Unchecked Despite Adverse Factors

PRODUCTION of military items continues to absorb most plant capacity and practically all essential materials and shop labor.

War expenditures for the first 22 days of June averaged $232 million daily, equaling the April record.

Tank and equipment plants hit by cancellation of Army orders are being converted as speedily as possible to other war work, some being re-routed into essential lines of activity, indirectly related to the war. Among these are locomotive and farm implement builders.

Disruption of production schedules for the steel and coal industries by the mine crisis was mirrored last week in reports of lower pit and blast furnace activity. However, only minor changes were recorded by barometers of other primary industries and barring the possibility of a protracted struggle over worker compensation in key war supply lines as a result of rising living costs, the trend of production through remaining weeks of the year should continue upward. Anything short of peak performance on the part of armament plants will prevent their attainment of 60 per cent of the 1943 quota to be filled in the last half.



LIVING COSTS: Imbroglio in Washington produced by preparations of Congress to erase OPA's food price rollback plan is getting worse. Purpose is to prohibit further disbursements for this kind of sudsidy.

Likelihood of larger allowances to subsidize increased production of vital war foods and critical metals through extension of the Commodity Credit Corp.'s authority, and intervention of the War Labor Board in support of subsidies as a means of holding down living costs call attention to the steady and almost parallel advance of wholesale commodity price and cost of living indexes in the past two and one-half years. Both indicators have covered considerable ground in the period.

Although prices for the bulk of classifications listed in the Department of Labor's commodity index have remained static since OPA's inception, upward adjustments to prevent hardship on some producers and the natural effect of shortages on prices of other unrestricted products have raised the combined index 23.3 points since January, 1941. In that month the figure was 80.8; a year later it had risen to 96.0. By March, 1942, when OPA received its grant of power to conclude price agreements, the index stood at 97.6. At the year's end the index reached 103.0. From January, 1943 it climbed 2.2 points to reach 104.1 per cent of the 1926 average in May.

Overall increase in the Labor Department's cost-of-living index since January, 1941 is 24.3 per cent, based on the years 1935-39 for an average. That January the index figure was 100.8. For the corresponding month of 1942 the figure was 112.0. New gains carried the index to 114.3 in March, 1942, to 119.8 at the close of 1942 and on up to 125.1 in May of this year, paced by spiraling food prices.

Administration chiefs have appealed to Congress to authorize direct subsidy payments to farmers as the only alternate means of putting a ceiling on living costs. This has been suggested to replace payments to processors which both houses voted to ban last week.

OPA officials are planning to proceed with the reduction of food prices where subsidies are unnecessary. The agency wants more money to expand its enforcement staff.

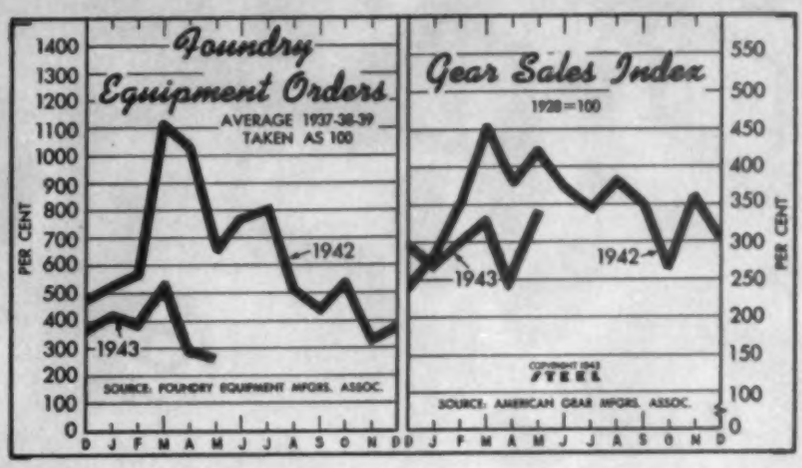
FIGURES THIS WEEK

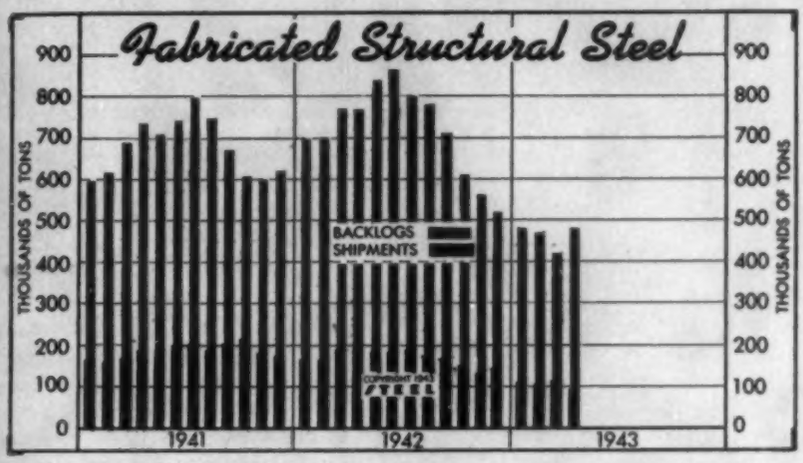
INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	98.5	98.5	99.0	98.5
Electric Power Distributed (million kilowatt hours)	4,120	4,098	3,992	3,457
Bituminous Coal Production (daily av.—1000 tons)†	2,025	1,954	1,928	1,854
Petroleum Production (daily av.—1000 bbls.)	3,955	3,966	4,006	3,710
Construction Volume (ENR—unit $1,000,000)	53.7	44.2	46.5	158.8
Automobile and Truck Output (Ward's, number)	19,185	19,080	16,775	22,935
TRADE				
Freight Car Loadings (unit—1000 cars)†	790†	868	853	853
Business Failures (Dun & Bradstreet, number)	60	78	64	198
Money in Circulation (in millions of dollars)	$17,154	$17,189	$16,902	$12,231
Retail Sales (change from like week year ago)	+14%	+17%	+7%	+18%††

*Dates on request. †Lag of one week. ††Six months. †Preliminary.

Foundry Equipment and Gear Sales

	Monthly Average (1937-38-39=100)		Index (1928=100)	
	1943	1942	1943	1942
Jan.	429.8	532.7	268	288
Feb.	399.5	567.9	303	353
Mar.	562.7	1122.4	334	455
Apr.	362.7	1089.3	240	378
May	348.9	653.6	342	421
June	.....	774.0	...	373
July	.....	800.8	...	344
Aug.	.....	510.8	...	380
Sept.	.....	446.4	...	351
Oct.	.....	540.6	...	263
Nov.	.....	338.8	...	359
Dec.	.....	382.5	...	306
Year	.....	646.7 Ave.	...	355





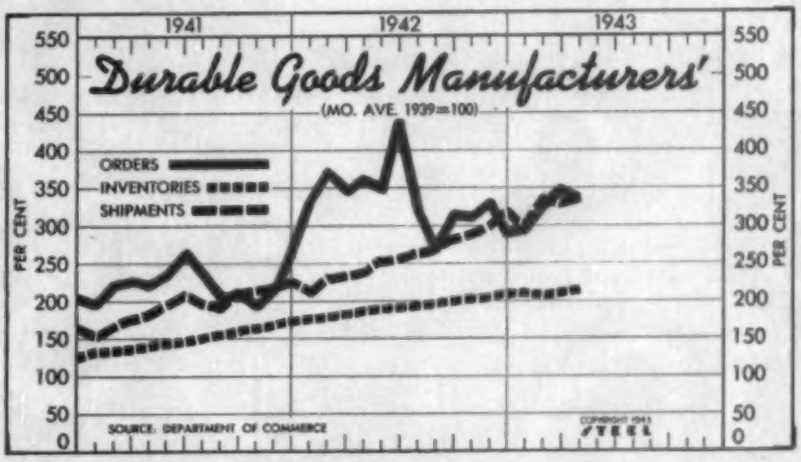
Fabricated Structural Steel

(1000 tons)

	Shipments			Backlogs		
	1943	1942	1941	1943	1942	1941
Jan.	109.9	167.8	164.6	489.3	704.4	601.5
Feb.	109.1	164.6	161.4	475.6	706.7	624.2
Mar.	113.3	191.3	170.2	424.4	777.7	697.2
Apr.	98.0	187.2	189.8	385.3	772.4	741.9
May	.....	184.2	191.9	.....	843.8	718.9
June	.....	182.7	200.5	.....	869.8	747.4
July	.....	189.9	203.0	.....	808.6	802.7
Aug.	.....	173.9	189.3	.....	783.5	754.5
Sept.	.....	169.8	204.1	.....	716.0	678.5
Oct.	.....	152.9	217.7	.....	617.7	614.4
Nov.	.....	130.4	182.6	.....	566.6	602.9
Dec.	.....	145.3	176.1	.....	523.5	626.0

Durable Goods Manufacturers'

	Orders		Shipments		Inventories	
	1943	1942	1943	1942	1943	1942
Jan.	384	414	298	214	211.5	179.2
Feb.	405	463	337	232	209.6	180.8
Mar.	433	427	330	235	210.7	183.4
Apr.	418	449	338	239	213.1	186.6
May	...	432	...	254	.....	190.2
June	...	545	...	256	.....	193.2
July	...	339	...	264	.....	195.8
Aug.	...	334	...	270	.....	198.0
Sept.	...	390	...	283	.....	200.9
Oct.	...	387	...	289	.....	204.1
Nov.	...	415	...	300	.....	207.7
Dec.	...	361	...	320	.....	210.1
Ave.	...	413	...	263	.....	194.2



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet, total in millions)	$9,058	$8,594	$8,685	$6,931
Federal Gross Debt (in billions of dollars)	139.7	140.9	139.3	76.5
Bond Volume, NYSE (millions of dollars)	52.4	52.4	68.5	28.8
Stock Sales, NYSE (thousands of shares)	4,672	4,966	6,333	1,412
Loans and Investments (in millions)†	$46,965	$46,808	$47,368	$31,677
United States Gov't. Obligations Held†	32,364	32,249	32,390	15,318

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$56.73	$56.73	$56.73	$56.73
Spot Commodity Index (Moody's, 15 items)†	244.1	243.8	245.7	229.2
Industrial Raw Materials (Bureau of Labor index)††	114.5	114.8	113.8	98.7
Manufactured Products (Bureau of Labor index)††	100.0	100.7	100.9	98.8

†1931=100; Friday series. ††1926=100.

EDUCATING The Women

. . . . can proceed with amazing speed, Chicago war plants find

By Mabel R. Putman

Fig. 1—Newly hired women employes at International Harvester's torpedo plant are given several days of classroom instruction prior to being taken into the shop. A refresher course in mathematics is given, reading of decimal fractions emphasized

FORCED by war conditions to employ women war workers, many manufacturing companies have been confronted with the problem of training and absorbing these workers into their organizations. Some companies have found the solution in special training courses especially adapted to women, others have found their previous method of worker training for men adequate.

International Harvester Co. and Stewart-Warner Corp. are two companies which have set up programs to meet their own particular production needs. While at Crane Co. the employment and training of women are on the same basis as that of men.

At Crane, women now make up 17 per cent of the production department and work right alongside men. Yet Crane has no school for women, but accomplishes their induction into industry without a training course as such. This is done by training women workers for individual jobs by starting them on machines with experienced operators. They are first put on the more simplified equipment and as they become more efficient they are put on more difficult and complicated machines. In the assembly line they start at the end of the line; as they learn, they are moved on to more complicated operations.

Pointing out that women are operating most all types of machines in the plant, including drill presses, turret lathes, engine lathes, punch presses, boring mills and centerless, internal and external grinders, G. L. Larson, general superintendent, says, "Women adapt themselves to standard equipment almost as readily as men. They very skillfully handle conveyorized operations. They are fully as efficient as men on drill presses of 8 to 10 pounds, which are the heaviest they operate. In some work they are more capable than men—in the assembly of brass valves, for example. They are fine inspectors, particularly in handling light-weight products."

Whereas the experience of some plants is that women workers are satisfied to continue permanently on a given opera-

Fig. 2. (Below)—One of a number of batteries of screw machines operated by student employes at Stewart-Warner Corp. The operators, all women, earn while they learn. Stewart-Warner is one of the first large American companies to operate a screw-machine school exclusively for women

Fig. 3. (Opposite page)—Girls operating hand screw machines at Crane Co., Chicago

tion, resisting transfer to more complicated and better paid operations, Mr. Larson says that the majority of Crane's women workers desire to progress. They are animated by the same motive as men workers—the ambition to operate more complicated machines and thus earn higher pay. This is true, especially, of those who have husbands or brothers in the service—they want to be kept busy. They particularly like piece work, because it is continuous and offers incentive for industry. They stay on the job and are fine employes, he says.

Crane has always prided itself on low labor turnover. This same situation still applies now that a large number of the workers are women.

Crane has never had a problem with absenteeism, and at present the figure is running surprisingly low. "Our employes are absent only when valid," says Ralph Stephens, work office manager. "They have a high sense of responsibility, as shown by the forms they fill out when absent."

International Harvester has a special training program for women workers in the company's torpedo plants. Because of the highly precisioned requirements of the work, only those with high school education are employed.

When interviewing a woman for employment, the supervisor seeks to learn her aptitudes, family history and physical capabilities. Can she sit all day? Can she stand all day? Can she work on any shift? Because there is not time to train her for more than one job, she is employed to do one certain type of work—according to her experience, education, strength, weight, height and estimated ability.

Before assignment to her job she sees two safety movies, listens to a lecture on safety, and takes a three-day study course. This study includes basic mathematics, with special emphasis on the reading of decimal fractions; shop practice; the use of gages, micrometers and depth verniers. Those going into engineering departments take motion economy and time study. This course often uncovers or develops aptitudes of which the employe was not formerly aware, according to Miss Sara Southall, supervisor of employment and service.

Following this preparation, the women are assigned to the special tasks for which they have been employed—machining, assembly, or inspection—and are trained on the job by supervisors.

The women who become inspectors take a more extensive training. In addition to mathematics they study instrument reading, blueprint reading, inspection gages and practice inspection.

When Harvester first employed women in its several torpedo plants about five months ago, they were put on only a few machines—milling, drilling and lathe—on which they did only the simplest jobs.

"Now that a third to a half of the workers are women they are doing practically every kind of work that men are doing, and they are doing it as skillfully and accurately as men," says Miss Southall.

They are operating engine lathes, bench lathes, turret lathes, hydraulic shapers, burring machines, hydraulic milling machines, grinders, and engraving machines. They do sweating, brazing, soldering, pipe bending and torch tinning. They inspect propellers and do intricate assembly work. They make blueprints and get engines ready to be tested. More recently they started on rockwell and Magnaflux testers, as well as lapping monel, bronze and brass parts for bulkheads and valves to naval specifications. And any day now they will be doing welding, operating punch presses and thread grinders.

Take Over Complicated Tasks

Each week women take over more machines and more complicated operations as the men workers go into the armed forces. When a man leaves, the foreman tries to shift men around so they will have the heaviest machines. But this is becoming more difficult to do, since the number of men employes is decreasing. Of the more than 15,000 operations necessary to produce a torpedo, to make and fit together the 3500 parts of an aircraft torpedo weighing practically a ton, women are engaged in doing most of them and will soon be doing them all.

Several months ago Harvester set up a short intensive all-over supervisory training program for women in two of its plants. This course was designed to supply qualified "supervisors of women" for Harvester plants where women are employed for either war production work or commercial manufacture.

The course extends over a period of 13 weeks and follows a pre-established written schedule. Its program consists of a series of conferences on foremanship matters and company policies; assignments in the employment, safety, and methods and rates departments; assisting the plant supervisor of women; assisting departmental supervisors and rotational shop training.

The eligibility requirements are that applicants should be Harvester employes who possess leadership qualities, pleasing personality and have an understanding of mechanical operations. They must be recommended by a Works committee composed of the supervisor of women, the director of training and the industrial relations manager, and have the approval of the works superintendent, the personnel department and general office.

The training emphasizes employment

(*Please turn to Page* 133)

Instruments

. . . . are vital for victory on the production front. You can help extend their life, maintain their accuracy by following the simple program outlined here

INSTRUMENTS are increasingly vital equipment in all industries. They are being applied to reduce labor costs in manufacturing processes, to lower fuel costs through exact control, to speed production, and to improve product quality and eliminate spoilage or rejects.

Continued enjoyment of these benefits is dependent, to a large degree, *upon proper care of instruments now installed*, whether they are doing 24-hour service in war plants, or normal service in civilian industries. Shortages of critical materials are necessitating substitutions in components of many instruments, while heavy demands upon manufacturers are slowing delivery of certain types regardless of the priority commanded by the purchaser. Needs of vital war industries make delivery of instruments impossible to many other companies wishing them.

Steps that can be taken to prolong the life of industrial instruments, regardless of manufacture, are outlined here. This information should be supplemented by careful study of instructions furnished by the manufacturer of each instrument to make sure the equipment is installed and operated according to his recommendations. If such instructions have been mislaid or lost, model and serial numbers of the instruments should be sent to the manufacturer with a request for new instructions.

Centralize Responsibility: All instruments in a plant should be the responsibility of one man, or a group of men, depending upon the number of instruments used. Responsibility for instrument care and maintenance should not be left to the men operating the equipment on which they are installed, as this practice will result in complete lack of maintenance until instrument breakdown, or in unnecessary or harmful tampering by individuals unfamiliar with instrument operation.

Locate Properly: Improper location and improper installation of industrial instruments probably cause more trouble and inaccuracy than fault or failure of the instruments themselves. It is as important that instruments be installed where they can be properly serviced and protected, as it is to install them where the bulb, thermocouple, photoelectric cell, radiation head or other "sensing" unit can reach the temperature, pressure, vacuum or other condition the instrument is to measure.

Eliminate Vibration: Prolonged vibration or shock resulting from careless handling are chief causes of instrument failure. Installing instruments on vibration mounts will minimize the effects of vibration. A better method is to mount instruments in locations where vibration is not present. Instruments should not be mounted upon moving equipment. If instrument panels also carry contactors, these contactors should be removed so that the shock to the instruments resulting from contactor operation is avoided.

Pivots and bearings, particularly of pyrometric instruments, will cause trouble from misalignment or deterioration if the instrument is subjected to sudden shock or persistent vibration. A

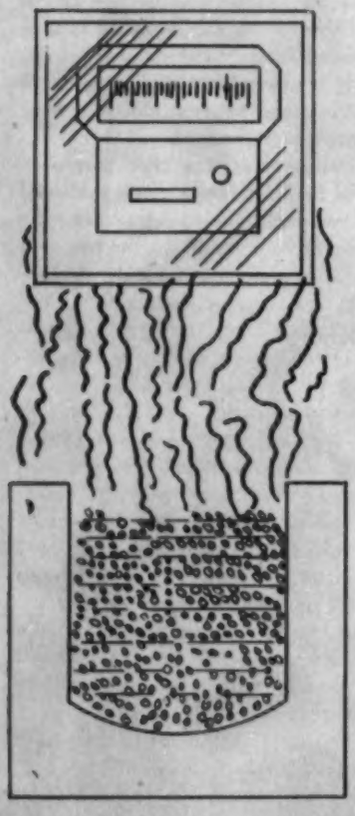


Fig. 1. (Left)—Vapor-tight cases must be used to protect instruments in corrosive atmospheres. This instrument will give good performance and long life when so protected

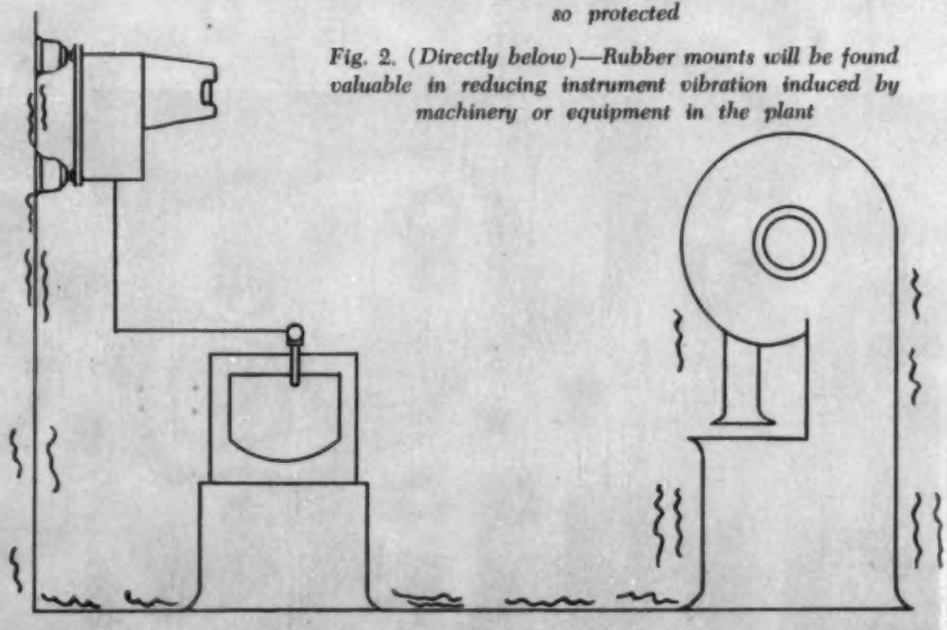


Fig. 2. (Directly below)—Rubber mounts will be found valuable in reducing instrument vibration induced by machinery or equipment in the plant

By THEODORE A. COHEN
Chief Engineer
Wheelco Instruments Co.
Chicago

sudden jar or jolt may crack a jewel bearing, or cause the pivot to jump out of its bearing, while repeated vibration will dull pivots and reduce an instrument's sensitivity.

Protect from Dirt: Next to excessive vibration, infiltration of dirt probably causes most industrial instrument trouble. Where instrument movements are particularly sensitive to foreign material that might affect their operation, they usually are provided with dust-proof cases. Such instruments should be opened as infrequently as possible, and then preferably in the instrument shop or in a room where provision can be made to keep the parts clean. The slightest particle of dust or lint caught in the air gap of a millivoltage pyrometer, for example, can obstruct the free movement of the coil, while a metallic particle adhering to the pole pieces of the permanent magnet can stop functioning of the instrument completely.

Avoid Excessive Temperature: For best results, excessive temperatures, both high and low, must be avoided at the point where the instrument is installed. An instrument is built to give best operation at room temperature, approximately 70 degrees Fahr., and prolonged use at extreme temperatures will affect the instrument's accuracy.

All instruments are subject to error in measurement if exposed to large changes in room temperature, since exact compensation for such changes, over large ranges, is uncommon. It is best to mount instruments in locations where minimum temperature changes will occur at the instrument. Instruments should not be subjected to ambient temperature changes larger than 80 degrees Fahr.; for example, from 40 to 120 degrees Fahr. It is preferable, however, to keep the temperature at the instrument as close to 70 degrees Fahr. as possible.

Pyrometers, as well as other instruments, should not be placed where they will be subjected to the blasts of heat whenever a furnace door or oven is opened. Temperature indicating, recording and control instruments exposed to radiation from a furnace are subject to errors due to differences in temperatures between one side of an instrument and the other. This can result in thermal currents being set up within the instrument, which may produce erratic measuring results.

Corrosion Hazards: Any instrument, regardless of its function, will be impaired if placed in a corrosive atmosphere. Corrosive fumes attack instrument finish, moving parts, measuring systems and may directly result in measuring error and impaired or erratic performance. Special corrosion-proof cases are available for most instruments, but even they do not give absolute protection when the necessity of opening case doors for chart changes on recording instruments, and adjustments to other instruments, is considered. A small compressed air line connected to the case, with an escape provided through a small breather hole in the case, will properly ventilate the case and provide a slightly excess pressure within it to keep out room atmosphere at all times.

Corrosive fumes will also attack bulbs, bulb sockets, connecting tubes between bulbs and instruments, thermocouples and lead wires. Painting bulbs and bulb sockets with corrosion-resistant paint will prolong their life. A badly corroded bulb socket should be replaced to prevent its complete failure and resultant damage to the bulb.

Tubing and Lead Wires: If protection tubing for capillaries of filled-system instruments is damaged, wind it with tape to prevent further deterioration. Carefully remove any sharp kinks in the tubing. If tubing or lead wires run near the floor, build a housing over them or fasten them securely to some solid object where they will not interfere with, or be disturbed by passing traffic. In the absence of metal conduits for protecting capillary tubing between bulb and instrument, wooden strips can be employed to give the same protection.

Lead wires from thermocouples of pyrometers, or sensing elements of other instruments, should be located so they will not be snagged by workmen, passing trucks or cranes. Examine insulation regularly, and take steps to prevent its abrasion. Worm or cracked insulation can be taped, and connections should be checked to make sure they are tight. Locate lead wires away from flames, hot gages, hot pipes and water or oil drips.

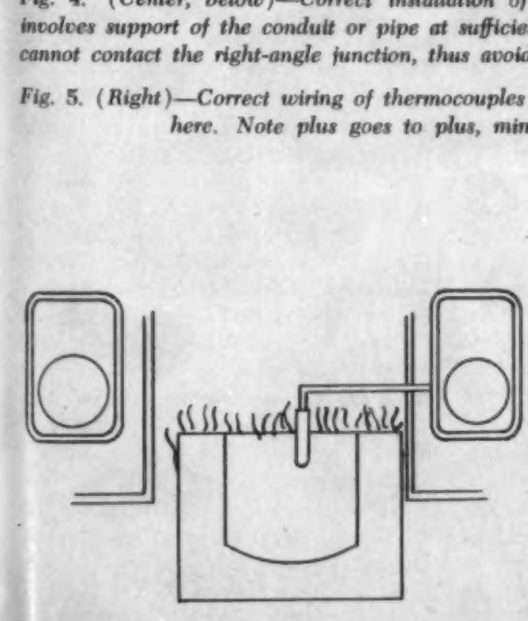
Avoid Excessive Moisture: Excessive moisture will often harm industrial instruments. For installations where mois-

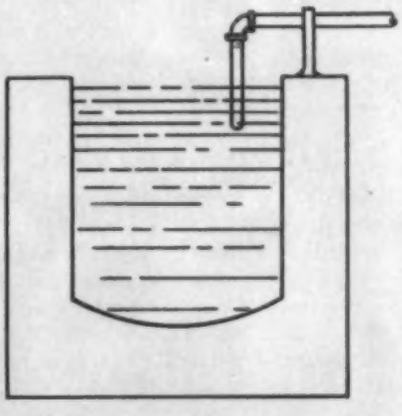
(*Please turn to Page* 135)

Fig. 3. (Left, below)—Shields should be used to deflect heat radiated from furnaces, ovens or processing equipment. Accuracy of the instruments shown here will be unaffected for they have been given protection

Fig. 4. (Center, below)—Correct installation of instrument "sensing" unit involves support of the conduit or pipe at sufficient height so that the liquid cannot contact the right-angle junction, thus avoiding corrosion at that point

Fig. 5. (Right)—Correct wiring of thermocouples to the instrument is shown here. Note plus goes to plus, minus to minus





New Trails in . . . .

SURFACE FINISHING

Aircraft Engine Parts

Instead of finishing surfaces of aircraft engine parts by polishing all over to a near-mirror finish, recent investigations indicate that shotblasting or "shot-peening" affords significant savings in time, floor space, abrasive, labor and overhead. Most significant is the great improvement in fatigue life, fourfold to tenfold increases in fatigue life of Allison engine connecting rods being reported

SEED which may well germinate into an entirely new concept of the optimum surface finish for aircraft engine parts—pistons, connecting rods, crankshafts, camshafts, rocker arms, and the like—has been sown in a series of industry conferences held at monthly intervals since the first of this year. Represented on the Aircraft Engine Production Committee of the Central Aircraft Council, which has been examining the problem in detail, are engineers from plants of leading aircraft engine builders — Wright, Pratt & Whitney, Allison, Packard, Continental — plus key men from the various automotive plants which are now licensees of Wright as well as Pratt & Whitney. Chairman is R. N. Brown of Packard.

The ball was started rolling at an early meeting by an "old-line" aircraft man asking for discussion on the question of whether there is "too much dolling up and fussing" on some engine parts. General practice in the finishing of aircraft engine parts is to rough machine, rough grind, heat treat if necessary, finish grind and finally polish to a near-mirror finish all over the part, with several magnaflux inspections included. Reason for this meticulous finishing technique is that any small surface discontinuities, scratches, tool marks, nicks or the like can become focal points for fatigue failure, particularly in highly stressed areas.

For several years, technicians in the motor industry have been experimenting with the use of shotblasting on machined steel surfaces to improve fatigue life. Spring leaves and coils, valve spring wire and other parts have shown remarkable increases in fatigue life after shotblasting and the finish was accepted for production work. Later, tank parts (STEEL, May 25, 1942) were shotblasted with encouraging results, and in November, 1942, J. O. Almen of General Motors Research Laboratories, presented his history-making technical paper before the Detroit chapter of the American Society for Metals, going into detail regarding the mechanics of what shotblasting does to metal surfaces and suggesting a means for gaging the extent of the shotblasting technique. This extensive report was published in STEEL in two sections, March 8, p. 88 and April 5, p. 112.

It was only natural that the experience of the automotive industry with shotblasting, plus Almen's detailed study of the stress effects should lead to consideration of application of the method in aircraft engines. But such a change must proceed slowly, with ample opportunity for test and re-test. It cannot be an overnight shift, but certainly at this juncture the possibilities look exceptionally bright.

Shotblasting of Allison engine connecting rods, instituted early in the development of this engine, is reported to save 36 man-hours per engine over former finishing methods, plus further savings in floor space, considerable amounts of abrasive, labor and overhead; but, more important, *results in a fourfold to tenfold increase in fatigue life* as a result of the cold working or prestressing. Shotblasting of a "notched" part such as a connecting rod produces greater improvement in fatigue life than is the case on a part with more regular contour such as a crankshaft, according to Allison engineers, but even in the latter case a 30 *per cent improvement has been effected by shotblasting.* Nitriding of crankshaft has been found to develop a still further improvement in fatigue properties.

Almen dissents from the view that properly shot-peened crankshafts will show less improvement in fatigue durability than properly shot-peened connecting rods. However, he points out, the peening procedure that is suitable for one is not suitable for the other.

Packard some time ago turned to shotblasting of connecting rods for its marine engine, although it required 750 hours of test runs to obtain approval, despite the saving of 30 man-hours production time per engine and increase in fatigue life of rods so treated. These rods are polished with an 80-grit wheel after machining, then shotblasted with 0.027-inch steel shot in four positions, to reach all surfaces. Control is achieved by size of the shot and by time limits in the processing. Cold working of the material by shotblasting results in some distortion, so the practice is to grind the holes in both ends of the rod after shotblasting.

Gears and rocker arms for the same engine also are now being given a grit-blast finish. The former are blasted all over with 90-mesh grit after heat treat, with the teeth ground after blasting in most cases. The rocker arms are polished with an 80-grit wheel, giving about 75-microinch profilometer reading, then shotblasted with 0.027-inch steel shot. Saving of 12 man-hours per engine is accomplished by changing the rocker arm finish from the former fine polish.

Profilometer readings of the surface finish left by grit blasting or shot peening do not give a true measure of the effect of the treatment, Almen notes, pointing out that actually it makes no difference what the surface roughness is except that some finishes may be more pleasing to the eye than others. He sees danger in using profilometer readings to measure shot peening rather than measuring instruments that have real significance.

From the foregoing case studies it is apparent there are two general aspects to the shotblasting treatment. One is the saving in man-hours involved in careful polishing, the other is the important improvement in fatigue life as a result of stressing the surface layer of metal. There still exists some question as to the maximum surface roughness permissible before shotblasting. In this connection Almen cautions that the use of grit prior to shot peening should be regarded with suspicion, and adds that it has not been proved that all machine finish marks must be erased by shot peening. He suspects that good durability can be obtained even though machining marks are still visible.

An important point is the depth of the stressed layer of metal which is in turn related to the time of shotblasting. Some data show 5 to 10 seconds required

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"PINCH-HITTER": Sparks fly as this Westinghouse machine, remodeled for war duty at the company's Nuttall Works in Pittsburgh, grinds the counter bore on a ring gear for the wheel of a 100-mile-per-hour electric locomotive. A special boring grinder not being available, a suitable boring mill was converted quickly into the grinder shown here

for each of four passes over a connecting rod. Other vital considerations are the size of the shot, feed and velocity of the shot and distance from the shot outlet to the part. Of these, Almen considers velocity of the shot highly important.

Depth of the compressively stressed layer, he observes, is governed by the size of the shot and velocity. The feed is important in providing complete "coverage". The distance from the work affects coverage and velocity. Time in the blast also affects coverage.

(*Editor's Note:* Not too much is known about the requirements of shot for prestressing applications, insofar as such factors as size, sphericity, hardness and analysis are concerned. Suppliers are few in number, including such companies as Globe Steel Abrasive Co., Pittsburgh Crushed Steel, American Steel Abrasives, National Metal Abrasives, Steelblast Abrasive, Steel Shot & Grit, Alloy Metal Abrasives. Several of these are reportedly controlled by the Kann interests in Pittsburgh. While some of the material is called steel shot, actually it is nearest to a cast iron, prepared by blowing water under pressure against a stream of molten iron. Intensive studies are now being pushed into properties of various analyses and sizes. One thing to be avoided in shotblasting for prestressing is the re-use of fragmented shot whose sharp points may do more harm than good to a machined steel surface. For proper peening action, shot must be round and uniform size, with broken particles screened out. One possibility for making a uniform grade of real steel shot, although at first glance it appears rather costly, is to upset it from steel wire, much in the way BB shot is manufactured.

Parent companies in the radial engine field are not passing up the shotblasting process as a means of surface finish, but they are moving ahead slowly and examining every phase of the subject. One interest reports two disadvantages of the process: The tendency to distort thin sections, and the tendency to cover up magnaflux indications with the effects of shotblasting. There seems to be a question on the latter score, as some engineers claim the blasting will not cover up significant magnaflux indications.

The tendency to distort thin sections, Almen explains, is merely a manifestation of the desirable residual stress produced by the peening action, while the tendency to cover up magnaflux indications probably means that shallow magnaflux defects are rendered harmless by the peening operation. Deep defects, he adds, are not erased by the peening operation.

Shotblasting is being tried on such radial engine parts as valves, intermediate rear crankcase sections, on supercharger impellers at the roots of blades, link rods, rocker arms, reduction gear pinions and master rods. In one instance, connecting rods, were blasted with No. 20 shot in a Wheelabrator (American Foundry Equipment Co.) at a shot velocity of 240 feet per second. Previous to shotblasting, the rods had only a rough machine finish, showing profilometer reading of 40 to 50 microinches, but fatigue tests on the treated rods showed their fatigue life to be as good as polished rods.

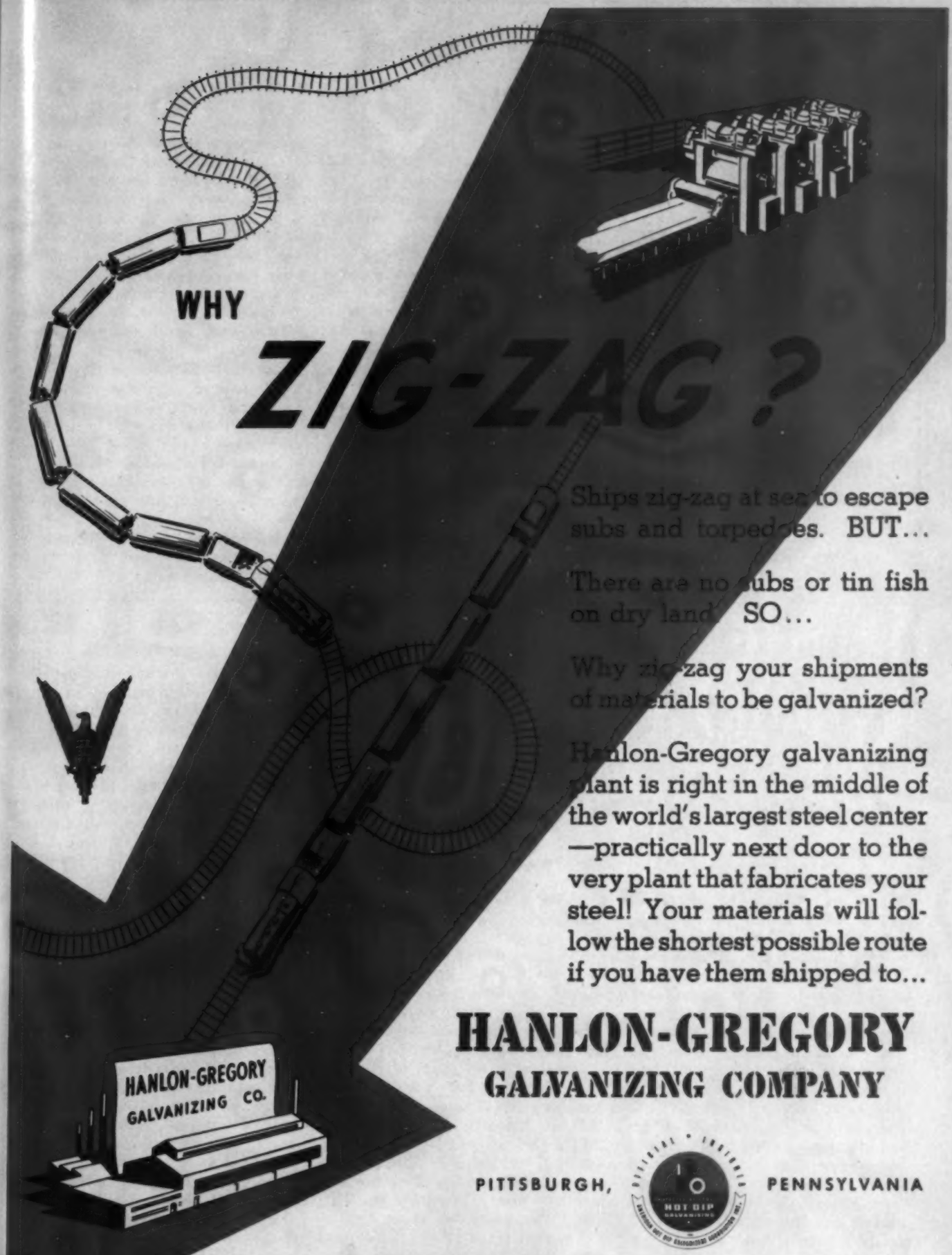
In this operation the rods are placed on a table at a 30-degree angle and are turned four times so the blast covers all surfaces. Protective buttons are used in bored holes, but may not be necessary. A growth of the rods of around 0.008-inch was observed, but this did not exceed inspection limits. This increase, Almen suggests, is again the manifestation of desirable residual stress. Since the surface is highly stressed in compression, it follows that the core material must be stressed in tension.

Interestingly enough, Mr. Almen is now devoting the major portion of his time to making experiments and writing specifications for shotblast treatment of various parts, being under contract to the National Defense Research Council. His findings are expected to become available to all companies engaged in war production. He is now preparing an extended supplementary report on shotblasting of aircraft engine parts, which will be completed shortly.

Because of his close association with the development, Mr. Almen was invited to present some of his views at the last meeting of the Aircraft Engine Production Committee. In introducing the subject, he summarized his experience by citing two important conclusions: (1) That fatigue failures are not caused by compressive stresses; and (2) that any surface, no matter how finely finished, is a stress raiser because it is a discontinuity in itself—that is, it is not supported by other particles of the metal.

Pointing to the well-known fact that carburized parts carry more load than

(*Please turn to Page* 147)



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CONVENIENT CHART SHOWS . . . . .

Tool Tipping Procedure

THE FOLD-OUT INSERT which appears opposite this page is devoted to publication of a chart listing the details of recommended practice in "Tool-Tipping Procedure." It is sponsored jointly by the Tool and Conservation divisions of the War Production Board. The chart is intended for the attention of everybody having a hand in maintenance of cutting tools. Additional copies may be obtained from STEEL.

Howard Coonley, director of the Conservation Division, points out that more than 10,000,000 workers now are using cutting tools for the first time and that there is great waste of critical materials because of breakage and spoilage. The chart is part of the campaign of the War Production Board, through the Conservation Division, the Tools Division the Labor Production Division, the Training Section and the War Production Drive, to do an educational job in order to reduce tool breakage and spoilage.

Recently Mr. Coonley asked the National Industrial Advertisers Association and the Advertising Council to encourage industrial advertisers to insert in their advertising copy the slogan "Tools Are Weapons—Treat 'em Right." Because the problem is so acute industrial advertisers in general, rather than just those interested primarily in cutting tools, are also asked to make use of this slogan.

Keith Evans, Inland Steel Co., Chicago, and Bernard Dolan, advertising manager, Peter A. Frasse & Co. Inc., New York, head up the participation in this drive of the National Industrial Advertisers Association, while Thomas Young, advertising manager, U. S. Rubber Co., New York, is responsible for the participation by the Advertising Council.

Mr. Coonley points out that a tool care policy within a plant is bound to break down if it is not observed by all who handle cutting tools. Therefore, he urges the need for labor and management in each plant to set up a uniform plan of tool maintenance and see to it that everybody concerned with tool maintenance carries out the plan.

The WPB Conservation Division and Division of Information now are developing posters, stickers, employe magazine matter and other material aimed at helping to arouse a high level of interest in the need for conserving cutting tool life. Information as to campaign participation may be obtained by writing to Malcolm Lund. Campaigns Manager, WPB Information Division, 11th and H streets, N. W., Washington.

Make Your

TOOLS LAST LONGER

. . . . with the conservation program outlined here. Full details on tool tipping also included

TOOL BREAKAGE is one of the most paralyzing factors affecting our war output today. To meet this emergency the Tool Conservation Division of WPB is instituting an educational campaign to bring tool care instruction to some 12,500,000 new workers who are now handling cutting tools for the first time.

The recent action of the War Production Board in ordering the curtailment of new machine tool production in favor of a greater use of existing tools may be seriously hampered unless misuse and breakage of cutting tools are sharply reduced. American manufacturers are producing more cutting tools than ever before—enough to do the job under normal tool handling. Because of the alarming rate of breakage, however, the demand is, in many categories, in excess of industry's capacity to produce.

Any substantial increase in tool production at this time is unlikely, owing to the lack of highly skilled tool makers and the scarcity of such hardening alloying elements as molybdenum, vanadium, tungsten, chromium and cobalt.

Greater conservation through educational methods and by further reclaiming of damaged and broken tools through grinding and tipping offers the obvious solution. It is impossible for the government to set up any such plan for worker training which would be applicable to every plant. Yet, it is expected that a well rounded program to educate the workers in all plants to recognize faulty shop procedure should go far in remedying the present situation.

Working through plant management, WPB's Tool Conservation Division will attempt to put across to the worker the reasons for the shortage of cutting tools and the dangers of continued tool wastage. Such fundamentals as the types of tool steels, types of individual tools, and the selection of the proper type in relation to the work, will be brought to the attention of the employes. Other subjects will include the relation of speeds and feeds to tool life and the importance of lubricating and cooling.

While it is not contemplated that the individual worker should be instructed in the care and use of tools other than those he actually handles, he should be thoroughly familiar with his own tools. To this end WPB is requesting plant management to see that employes receive specific training on the selection of tools; their proper installation in the machine, and their care, repair and salvage.

Following are the four main issues involved in the cutting tool conservation program:

Choose Tool that Fits Job—Each application should be carefully considered to determine which tool would give MAXIMUM CUTTING EFFICIENCY, that is, in terms of pounds of metal removed per grind. It is a recognized fact that there is no universal tool metal. Each type has its place, dependent on material being cut, type and condition of machine tools available, nature of cut, and other applicable factors.

In addition to choosing the correct tool for the job, it is most important that the tool be properly used. Such factors as grinding, coolant, operating technique, etc. are of vital importance to tool life and consequent conservation of cutting tools.

Choose the Alloy that Performs Best

TOOL-TIPPING PR

BRAZING

LOW TEMPERATURE

This process is especially adapted to the requirements of high speed steel.

APPARATUS: An oxyacetylene welding torch. A vise or jig in which to hold the tool in a convenient position.

MATERIAL: A silver brazing alloy shim of proper thickness, usually .003" to .006", with a melting point of 1175°F. maximum. A flux of a type that will dissolve oxides found on high speed steel, and which will be fluid and active at brazing temperature. A good grease solvent.

PROCEDURE for hardened high speed steels:

1. In joining an inserted tip to a shank, machine or grind a recess in the shank to match the tip.

2. Make sure that the surfaces of both recess and tip which are to be brazed are fairly smooth. A milled surface or equivalent is satisfactory.

3. Clean all surfaces to be brazed with a good grease solvent.

4. Place the shank in the vise or jig with the recessed end projecting.

5. Coat the recess and the tip with flux.

6. Place the shim of silver brazing alloy on the entire recessed surface to be brazed.

7. Place the tip of the shim.

8. Apply heat with the oxyacetylene torch. The flame should be neutral or slightly reducing.

9. Direct the flame to the underside of the shank below the recess, moving the flame back and forth to distribute the heat evenly. Heat the shank until it becomes a barely visible dull red.

10. Withdraw the flame to a greater distance from the work and continue heating until the brazing alloy melts, keeping the temperature as low as possible in order to avoid drawing the temper from the tip.

11. Make sure the alignment of the tip is correct.

12. Press the tip firmly into place. Maintain the pressure until the brazing alloy has solidified.

13. When the brazing alloy has solidified, as determined by eye, immerse the tool in oil long enough to set the braze, then cool in air. The hardness along the cutting edge should be comparable with that of solid hardened high-speed tools.

PROCEDURE for butt joints, etc. In joining a tip to a shank when a notch is not used, such as in the case of a butt joint, the procedure is similar, except that additional care must be taken to make sure that the alignment is accurate.

HIGH TEMPERATURE

This method is used for tipping with annealed high-speed steel.

APPARATUS: A high heat furnace of the type used for hardening solid high speed tools, or for brazing tungsten carbide bits; it is advantageous, although not necessary, to have the furnace of a type in which the heat can be localized on the end of the tool. Also, a preheating furnace is useful; but if not available the required preheat may be applied in the cooler portions of the high heat furnaces.

MATERIAL: For brazing with copper: Copper shims .003/.005 inches in thickness. Brazing flux suitable for brazing with copper. A good grease solvent.

PROCEDURE for brazing with copper:

1. Machine or grind a recess in the shank to match the tip. Make sure that the surface of the tip which is to be brazed is fairly smooth. A milled or ground surface is satisfactory.

2. Remove all grease and dirt with the solvent.

3. Coat the tip and the recessed end of the shank with copper type brazing flux.

4. Place the shank in the furnace, and heat until the flux flows freely. Maintain a neutral or slightly reducing atmosphere.

5. Remove shank and fit the copper shim into the recess.

6. Fit the tip onto the shim.

7. Preheat the assembled tool to about 1600°F. in the preheating furnace or in the cooler portion of the high heat furnace.

8. Transfer the tool to the high temperature furnace and hold it at the proper quenching temperature for the grade of high speed (2200° to 2350°), until the tip has soaked out. Soaking time should be kept to a minimum to prevent grain growth.

9. Since the melting point of copper is 1980°F., the copper shim will have melted and spread over the interfaces. Withdraw the tool.

10. Adjust the alignment.

11. Press the tip firmly into place to squeeze out the excess copper and flux.

12. As soon as the copper has solidified, quench the tipped end in oil until the temperature has dropped to below 200°F.

13. Temper the tool at 1000°/1050°F.

MATERIAL for brazing with ferro-alloy cement: Ferro-alloy cement, copper sulphate, sulphuric acid.

PROCEDURE with ferro-alloy cement:

1. Prepare a flat surfaced recess for the tip. The surfaces to be joined should be fairly smooth. Milled finish or equivalent is satisfactory.

2. Clean surfaces with the grease solvent.

3. Prepare a solution of 3 ounces of copper sulphate and 10 drops of concentrated sulphuric acid, dissolved in one pint of water. With this solution paint the surfaces to be joined.

4. While the surfaces of the recess are still moist sprinkle over them a layer of commercial ferro-alloy cement. Smooth out the layer so that it is flat and about 1/32 of an inch thick.

5. Press the tip firmly into the recess.

6. Set the tool aside for an hour or more. This will affix the tip securely enough to permit handling.

7. Preheat the tool to about 1600°F., in the preheating furnace or in the cooler portion of the high heat furnace.

8. Transfer the tool to the high temperature furnace and raise it to the quenching temperature proper for the grade of high speed involved (2200° to 2350°F.).

9. Soak out the tip, but keep the soaking time to a minimum.

10. Withdraw the tool and press the tip into the recess to squeeze out excess cement, using foot treadle, or tongs.

11. Check the alignment.

12. When the cement has solidified quench the tool in oil or air until the temperature has dropped to below 200°F.

13. Temper the tool at 1000°/1050°F.

R

This method is particular
to butt welding a high-s
a simple steel shank, but
be used for welding a tip
of a simple steel shank
the end, although conside
is required in this proce

APPARATUS: A
flash welder, mar
driven, and equipp
fit the contours of

PROCEDURE for welding hardened high-speed steel:

1. Preheat the parts to be welded to about 1000°F.

2. Clamp the tip or stub in one pair of welding dies, and the shank in the other pair.

3. Make sure the alignment is correct.

4. Weld. The duration of the flash, the pressure, and the amount of upset required for an efficient resistance flash weld are details which can be learned only through experience. Assistance may be obtained from the manufacturer of the welder.

5. Immediately at the conclusion of the weld, place the tool in the furnace at a temperature of 1000°/1050°F. and maintain this temperature for about 2 hours. This will relieve thermal stresses at the welded section. The tool should not be permitted to cool in air from the welding heat.

6. At the end of the tempering period, remove the tool from the furnace and cool in air.

7. Remove and flash and dress the upset.

8. Form the cutting edge.

Reproduced through courtesy of Tools and Conservation Divisions WPB.

PROCEDURE

WELDING

RESISTANCE FLASH WELD

rticularly adapted high-speed tip to nk, but may also g a tip to the face hank adjacent to considerable care procedure.

It is desirable, for butt welds, that the areas of the sections of the two parts to be welded be as nearly equal as possible in order to avoid disproportionate rates of heating. A difference of 10 per cent is the maximum that should exist in applications of this method.

US: A tempering furnace. A standard resistance r, manually operated or motor or hydraulically equipped with changeable copper dies machined to ours of the sections to be gripped during welding.

PROCEDURE for welding annealed high-speed blanks to simple steel shanks, not for subsequent forging:

1-4 as above.

5. At the conclusion of the weld, bury the tool in lime, mica, ashes, or other inert material until cool, to prevent excessive thermal shock.

6. Anneal the tool according to high-speed steel practice.

7. Remove the flash and dress the upset.

8. Form the cutting edges.

9. Harden and temper according to high speed practices.

PROCEDURE for welding annealed high-speed blanks to simple steel shanks for subsequent forging:

1-4 as above.

5. From the welding temperature, cool the tool in lime, ashes, or other inert material.

6. Anneal the tool according to high-speed steel practice.

7. Forge. Then cool in lime, ashes, etc.

8. Anneal according to high speed practice.

9. Form the cutting edges.

10. Harden and temper according high speed practices.

MECHANICAL TOOL HOLDERS

Tool holders are well adapted to the requirements of high-speed steel. They are designed to hold cutters for lathe and planer tools, and consist of a simple steel shank with a recess through one end, into which a cutter is inserted. The cutter is held in place by a set screw. Thus, a relatively small inserted cutter replaces the high-speed steel content of a solid tool.

Although tool holders are made in a number of shapes for various operations, and in a wide size range, they are particularly useful from a conservation standpoint in sizes below about ½ inch. This is because the various brazing and welding methods of tipping are not economically suitable to sizes under ½ inch.

Further details, including sizes, types, and applications of tool holders may be obtained from manufacturers.

PRESSURE WELD

PRESSURE WELD

This method is suitable for jointing high-speed stubs to simple steel shanks. The minimum size that can be welded economically is about ⅛ inch.

APPARATUS: Manual, mechanical, or hydraulic pressure machine that can apply 4,000-4,500 lb. per sq. in. of pressure. Pressure gauge capable of measuring twice this pressure. Alignment holding jigs. Heating apparatus, variable with size and shape of cross section to be welded, providing for oscillation of flame through a short distance above and below weld section. Auxiliary furnace capable of attaining temperature of about 1650°F. for slow-cooling welded piece.

PROCEDURE:

1. Smooth cut sections to be welded. A smooth machine finish or equivalent is satisfactory. The cut must be perpendicular to the length of the pieces.

2. Secure the high-speed stub and simple steel shank end to end in the welding apparatus.

3. Apply an initial end pressure of about 1,000 pounds per square inch of joint cross section.

4. Ignite the gas in the heating head. Adjust the flame to a neutral or slightly reducing ration.

5. Oscillate the heating head across the weld interface through a distance of about one-third the weld face diameter in either direction from the weld face, allowing a slightly longer play of flame on the high speed side. The pressure will now rise rapidly, due to thermal expansion of the heated sections. Then as the metal in this weld zone becomes heated into the plastic range the pressure gradually falls off. This will be at a temperature of 2300° to 2500°F.

6. When the welding pressure has dropped to a predetermined value of between 3,000 and 4,000 pounds per square inch, maintain this pressure, either manually or automatically. Upsetting will now take place.

7. When a predetermined optimum weld upset has been reached, release the pressure, and remove the piece.

8. Immediately transfer the piece to the annealing furnace at about 1650°F.

9. Cool the piece to room temperature at the rate of 100°F. an hour or slower. If this cooling cycle is followed, a hardness of 325 B.H.N. or less will result.

10. Remove the excess weld metal.

11. Machine the cutting edges.

12. Treat the tool according to standard high speed practice for the grade.

with **Least**—This aspect is known as ALLOY EFFICIENCY. Sintered tungsten-chromium cobalt types contain higher percentage of critical elements than do the high-speed steel types. However, the production capacities of the first two types are far higher when no breakage occurs.

Modernize Your Inventory—To obtain *MAXIMUM INVENTORY EFFICIENCY*, obsolete tools should be eliminated through regrinding, reforging or remelting, and wherever possible, tipped tools should replace full shank tools. Tungsten-carbide tools are always tipped, but tipping with cast alloys and high-speed steels is less common, though development in this direction is proceeding rapidly. Details of these practices may be obtained from the manufacturers.

Salvage Your Scrap—Worn or damaged tools should be reclaimed by regrinding, reforging, brazing or welding. Stub ends and broken tools should be used for tipping or else, along with turnings and drillings, should be segregated and returned to the mills. Grindings should be segregated for future salvage, restricting the loss of critical materials to an absolute minimum.

Listed below are *nine rules of tool care* submitted to WPB by representatives of industry:

—*PUT YOUR TOOLS AWAY.* Tools are weapons; they must be kept sharp.

—*CHANGE TOOL BITS BEFORE THEY GET TOO DULL.* You can work faster and better with sharp tools.

—*KEEP SPACING COLLARS CLEAN AND PARALLEL.* Drunk milling cutters wobble, causing run-out.

—*FIT THE CUTTER SNUGLY AND EVENLY ON THE ARBOR.* If you force or pound the cutter on, it won't run true.

—*KEEP THE YOKES CLOSE TO THE CUTTER.* Otherwise you will get chatter and run-out.

—*LOOK OUT FOR THE POINT OF A DRILL.* If the point hits the table when you take it out it gets dull.

—*USE GUIDES TO LOCATE JIG-HOLES.* If you locate with the drill itself, you dull the point.

—*PUT BLOCKS CLOSE — CLAMP WORK TIGHT.* It the blocks are too far apart, your work will be springy and the drill may snap. If clamps are loose, the work may turn and hurt you or your fellow workman.

—*KEEP A ROCKER REST FLAT WITH SHIMS.* Your tool point takes a better bit when the tool rest is flat.

The director of WPB Tool Division recently stated: "We must get across to every worker on every production line the fundamental idea that tools are war weapons and that they must be as well cared for as guns. If all trainees learn to handle their tools with care and skill it is estimated that an increase in production of approximately 10 per cent could be achieved. At the same time the tonnage of critical tool steels required would be substantially decreased."

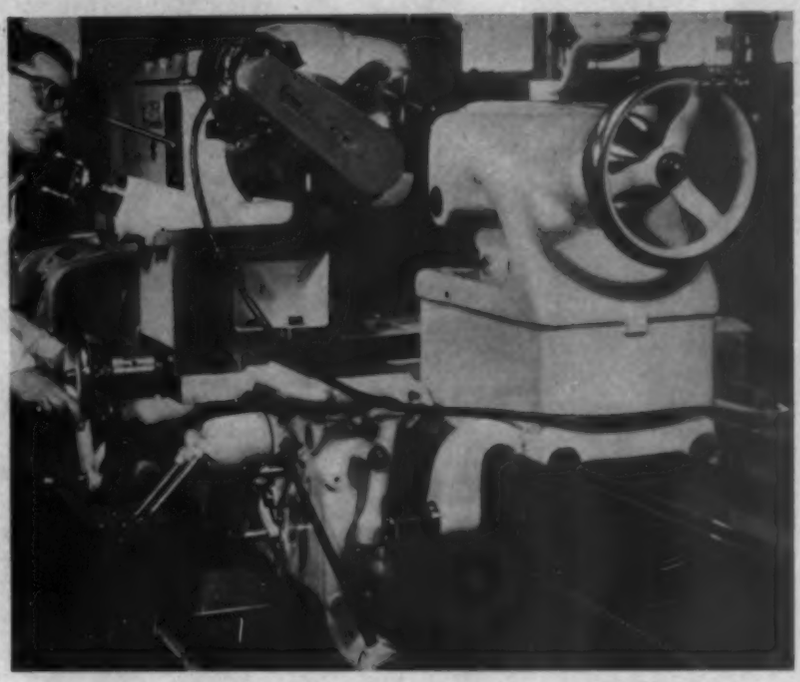
The Importance of Tipping: We do not have enough alloys available for our essential war applications and for projected tool production. Besides, experienced tool makers are becoming harder and harder to get, and tool production itself becomes a serious factor.

Therefore, we must do the job with what we have, and stretch the active service of tool production, materials and labor by conservation in tool handling and by practicing TOOL TIPPING more extensively in all plants where cutting tools are used.

It should be emphasized that every plant should adopt a definite tool care program, making it a major part of employe training and creating a consciousness among all employes of the importance of tool conservation.

What are the factors that contribute to operating economy for the individual plant that adopts a definite tool tipping policy? First of all, delivery delays on new tools are eliminated. The tool problem in the plant can be largely solved right at home. Besides, a smaller number of tools needs to be purchased, and the inventory on tools can be much smaller. In the larger tools the cost of the steel is a great factor in the tool price. By tipping from discarded tools, this cost is greatly reduced.

In general, the practicality of saving and using valuable steels that would otherwise become scrap, is obvious.



THREE DIMENSIONAL PAINTING: Developed by Du Pont, "three dimensional painting" is defined as using various colors of paint on various machine parts to produce best light reflection qualities, to emphasize safeguards and to spotlight points of operation. Effect of system at United Air Lines central maintenance base in Wyoming is shown above. Operational parts of this lathe are painted a "spotlight" buff; safeguards are in international orange and the balance of the machine is gray. Less eye fatigue, fewer accidents and greater efficiency, it is said, are the results

The practice of tipping simple steel shanks with sintered carbide or with cast tungsten—chromium—cobalt alloys is standard, due to the nature of these metal, but tipping with high speed steels is a comparatively recent development.

The advantages to be gained by tipping with high speed steel are determined by the size factor. In general, sections under ⅛-inch cannot be tipped economically; sections from ⅛ to ¾-inch may or may not be tipped economically, depending upon type and application. Sizes over ¾-inch nearly always permit economical and satisfactory tipping.

From the over-all standpoints of both conservation and economy it thus can

(*Please turn to Page* 139)

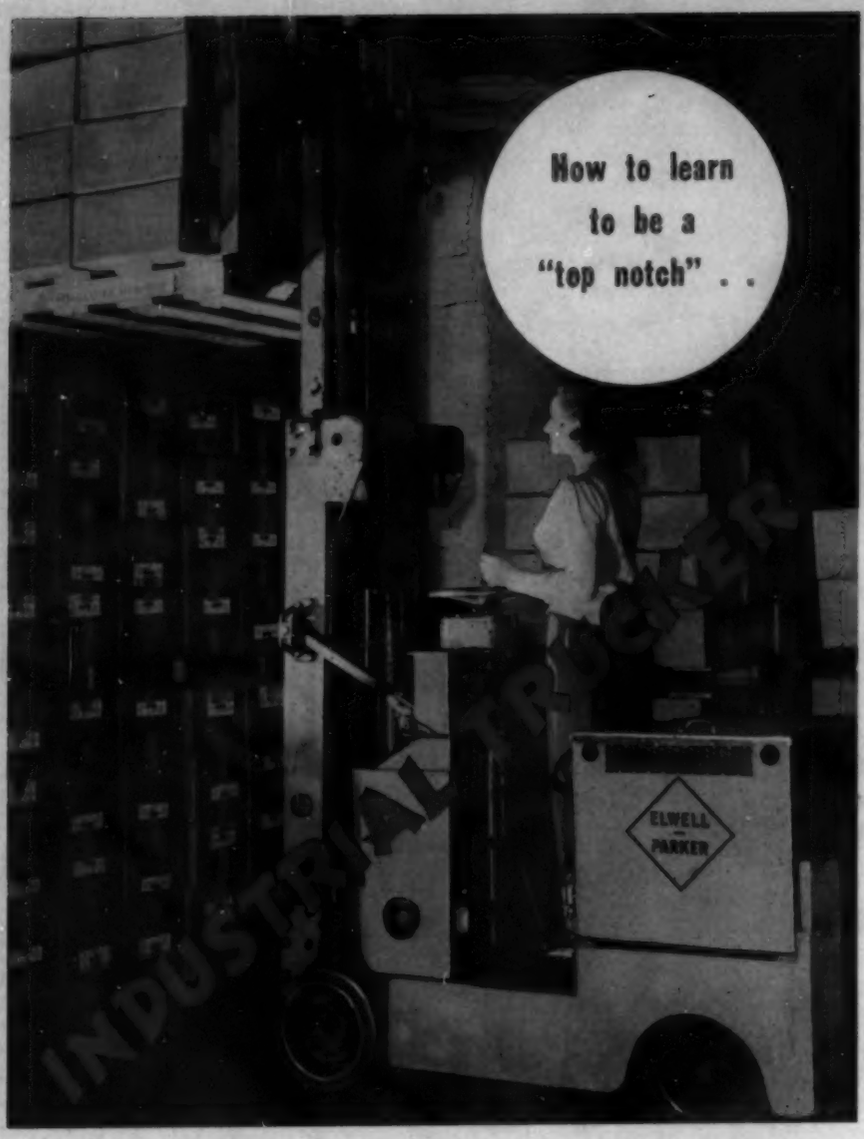


Fig. 1—Tiering or stacking loads is perhaps the most difficult and exacting part of trucking for the loads must be lifted and handled with precision

INCREASED volume of fighting materials scheduled for production during 1943, plus the definite prospect that women will constitute almost a third of the total personnel employed in war plants by the end of this year, emphasizes two vital facts:

—Women must be trained to become proficient in their new tasks within the shortest possible time following their industrial induction.

—Women must be made to feel a definite personal responsibility *in* and *to* their jobs, even though their employment on tasks normally performed by men may prove somewhat temporary.

Several months ago the Elwell-Parker Electric Co., Cleveland, with the approval of the War Manpower Commission, made a survey to determine the possibilities of training women to supplement the shrinking supply of men operators on power industrial trucks for the duration of the war. Replies from Elwell-Parker's own customers revealed that many were already using women successfully for this purpose and that a much larger group was seriously interested. Hundreds of executives requested detailed information.

American women by the thousands are stepping into jobs their friends, brothers, husbands have left empty for a time—or into new jobs created by the war. Whether they are to remain for weeks or months, the big thing is that they shall lose no time getting started—that they shall make every minute count.

Because it contains so many valuable suggestions and because it can serve so well as a guide for women learning to operate any industrial truck, Elwell-Parker Electric Co.'s recent booklet on learning truck operation is briefed here. The following material is addressed to the new operator:

Help your employer to turn out more and still more of whatever his factory is making for the war effort. Learn quickly to operate your truck properly. Your truck is a costly machine—probably your boss cannot get another until after the war. Nothing else can take its place—your own job and many other people's jobs will depend on your skill in keeping your truck busy handling materials on their way to war.

Remember, you are an industrial soldier—doing as much work with a truck as 5 to 10 men could do without trucks. Whatever your reason for becoming a factory or warehouse employe—whatever length of time you may keep on working—remember you have enlisted as an industrial soldier and that your first duty is to become expert on the job you have picked out.

Your skill in hustling loads with your truck will help other employes to go right on with their jobs too.

And if you are working in a production shop, your expert handling of the truck will keep *machines* busy as well as men—will enable your superintendent to get out every day's production of war materials as scheduled—to finish his contract on time—and to get busy on the next one in a hurry.

Your truck is a vital part of almost every kind of work that goes on at your plant. Materials aren't worth very much as long as they're left standing still—they have to be picked up and moved again and again in the process of becoming finished fighting products rolling toward the battle lines.

Your employer depends largely on trucks to keep loads moving from one department to the next and also within departments—saving time between moves and keeping men and machines working steadily.

As a truck operator, the greater your ability to move large or heavy loads safely and speedily from place to place, the more steadily will others be able to work—and the greater will be the output of war materials from your employer's factory or warehouse.

You will soon discover that the "do's" in truck operation are a lot more important than the "don'ts". The first one is—relax, but be alert. Like other worthwhile jobs, operating a truck is hard work—calling for plenty of common sense, good sound judgment and the ability to do the right, safe thing in split seconds.

You probably drive your own car, or at least are familiar with the starter, clutch, gear shift, forward and reverse speeds, brake and horn. Automobile experience will help you to understand the general principles of operating an industrial truck and will enable you to master the details quickly.

Your instructor will try to find a clear,

WHEN enemy troop concentrations see fragmentation bombs dropping from the bellies of low flying bombers, they dive for shelter on the double quick. For when one of these bombs bursts, it flies into a thousand pieces that allow but little chance of life for anyone not safely in a foxhole or behind a protective rampart.

The casing of these destroyers of life and morale is made of WELDED STEEL TUBING. It is a foremost example of the many ways in which this peace-time product is helping United Nations troops gain victory over the axis.

Our experience and equipment are devoted one hundred per cent to the production of WELDED STEEL TUBING and Steel Forgings for this use and many others where these items are at present employed. Our research is constantly on the lookout for additional ways in which they can be used . . . for places where they can do an equally good and speedier-in-production job than materials now specified.

If you have a problem that might be solved by the use of WELDED STEEL TUBING or Steel Forgings, bring it to us. By helping you we can perhaps do more to win this war. We want to do all we can.

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Fig. 2—Instructor first carefully explains controls and their function

open space for your first lessons in truck driving. The ideal spot is a paved floor or yard at least 25 or 30 feet wide and two or three times as long.

He will explain the pedals; the motors that drive the truck and the various levers that control those motors; the steering device and other details which you will memorize quickly. You will soon reach for them without looking.

Your instructor will take time to explain some points very carefully. Be sure you also take time to follow his explanations—above all, don't be afraid to stop him and ask him to repeat anything you may miss the first time.

If you are thorough in your learning, it may save you and your boss some costly guessing afterward, when the instructor has left you and you are strictly "on your own".

Watch out for these, among other important details:

—Moving the control levers: Your instructor will remove the covers of the controller boxes and show you how the contact fingers operate; and he will explain that the control levers must be moved or shifted quickly to avoid arcing.

An "arc" is a brilliant electric flash—a danger sign that always must be avoided even though it is under the controller cover. These flashes burn pits in the contacts so that controller fingers do not bear evenly.

—Starting the motors; moving and steering the truck: Now with the wheels parallel to the sides of the truck, the instructor will show you how to start the motors and move forward and backward (or "reverse").

First go in a straight line; then in an "S" as you will when making a series of easy loops at a safe speed.

—Applying the Brakes: Listen carefully to instructions about steering with one hand and putting on the brakes steadily and evenly by raising one foot, keeping your other hand on the controller handle. Then practice braking and steering for yourself while the instructor looks on. This is important.

—"Inching": This is the method of moving the truck forward very slowly and accurately when picking up a load on platform skids or pallets. It calls for close teamwork between foot, hand and head—between truck motors and brakes. Practice makes perfect.

—Lifting, hoisting, tilting are operations that can be done while the truck is standing still. Your instructor will help you to master these important operations—first with the truck standing still, and later with the truck in motion.

He will also show you how to "duck" overhead obstructions such as steam or water pipes, electric cables, etc., when you are operating the truck with a load raised or elevated at the storage.

Be sure to do your practicing at slow speeds until you have become confident of yourself and your ability to handle the truck safely in a pinch. Don't hurry.

The first point to learn is that you can start the truck only when you are standing on the pedals—when you step off, the truck stops within approximately 10 feet.

As you walk toward the truck, you will see that both pedals are partly raised. That means that the power is shut off and the brakes set and locked, so the truck cannot move. So long as the pedals remain in that position, the motors cannot be started nor the brakes released.

Now step into position with one foot on the pedal at your right. Keep your weight on your right foot. Lift your left foot and allow the left pedal to stay up.

Move the direction-indicating lever by: Pushing it *away* from you if you wish to travel forward; pulling it *toward* you if you wish to travel backward (in reverse).

Next, press down with your left foot. This will release the brake.

Now grasp the speed-controller handle firmly and draw it *toward* you into the first notch, which means low speed. Keep the lever in the first notch until you have learned to control the truck. There are two or three other notches or positions for higher speeds but you can learn those later.

Remember, you can stop the truck at any time by lifting your left foot and releasing your grasp on the travel-controller handle.

If it is necessary to start upgrade, engage the travel controller in first speed before releasing brake. Proceed in the proper manner by depressing the left panel, which releases the brake, and then continue into the higher speeds.

When operating on inclines, keep load toward the upgrade, regardless of the direction you are traveling.

To steer the truck: With motors shut off, move the steering wheel or tiller un-

Fig. 3—Steering operations start with lining up wheels with line on floor with motors shut off. Then operator tries to follow line, later learns curves

Why PLANNING can *not* be left until the end of the war

YOU HEAR many arguments pro and con on the subject of postwar planning now. Some say we must forget it—that it detracts from winning the war. Others say, without planning, Victory may only usher in defeat—a defeat of the very things for which we are fighting.

It seems reasonable that to meet new problems successfully—you must know what problems to expect. That requires study and analysis. To be prepared to do something about it when the right moment arrives, calls for planning beforehand. It is the function of the military to make plans for War. It is the function of business to make plans for Peace.

Such preparation and planning does *not* imply any sacrifice of maximum productive output nor any limitations on ingenuity on behalf of winning this war. For certainly no one can accuse American business of having a one-track mind. It has always proved itself capable of tremendous *doing* and far-sighted *thinking* at one and the same time.

To bring the boys home at the earliest possible date is the purpose which motivates all industry. But, we have another responsibility to those boys. It is, to be ready to *go* when they do come home—ready to launch the plans that will give them what they want most—an opportunity to work and attain the things and advantages they've been dreaming about "over there." *Let's not be responsible for an "Industrial Pearl Harbor."*

So, we at STEEL have no qualms about wholeheartedly co-operating in such an effort. Not in the hazy, foggy sort of Utopian postwar thinking, but in the common-sense kind of planning that every business should always be doing for the future.

We consider it part of STEEL's essential wartime service to look ahead—as we have always done—to provide information that will guide management in making decisions—in planning and preparing for new problems on the horizon. Under the direction of a Special Planning Editor, this information is being developed and made available through the columns of STEEL magazine. To you who want *more* and *better* information to use as a basis for planning . . . Watch STEEL.

E. L. Shaner

EDITOR-IN-CHIEF

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A Special Report to Industry on

POSTWAR PLANNING

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This report was published as a continuing series of articles in the magazine STEEL, January 25, 1943 — March 29, 1943. Because of its comprehensive coverage of present activity and thinking on this important subject, it has been reprinted in booklet form for wider distribution and easy reference. Additional copies are available on request.

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STEEL

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A Special Report to Industry on

THE POSTWAR AUTOMOBILE

●

This report was published as a continuing series of articles in the magazine STEEL, April 12, 1943 — May 3, 1943. Because of the widespread interest in this material, and the number of requests received from all branches of the industry, it has been reprinted in booklet form for wider distribution and easy reference. Additional copies are available on request.

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Time saved on production speeds the delivery of vital matériel to our fighting forces. Now, on the home front, it is a fight to the finish for maximum production.

South Bend Lathes can help you speed up production on toolroom and manufacturing operations. They have dependable precision, a wide range of speeds and feeds, and the strength and rigidity for effective use of tungsten carbide tools. Their ease of operation also contributes to their efficiency.

South Bend Engine Lathes and Toolroom Lathes are made in five sizes ranging from 9″ to 16″ swings, with bed lengths from 3′ to 12′. The Turret Lathes have 9″ and 10″ swings. Catalog 100C will be mailed upon request.

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Fig. 4—When learner can maneuver truck empty, she learns to pick up loads and move them

til you think the wheels are straight with the truck. Lean over and sight them by a line along the floor, to make sure that they are.

Then, if your truck steers with a wheel like an automobile, look carefully at the position of the knob and fix that position in your mind. For a full turn of the truck from right to left or vice-versa, it may be necessary to revolve the wheel several times.

If you steer your truck with a tiller handle that swings left and right like a boat tiller, pull it to exact center—with the hand-grip toward you and the tiller handle pointing directly ahead. In that position, the truck will travel straight forward or reverse. To steer to the *right*, pull the tiller *toward* you. To turn to the *left*, push the tiller *away from* you. When you leave the truck push the tiller *up*, out of the way.

If the truck has a pump steer that moves up and down, you will find the wheels are set so the truck will travel straight ahead or reverse, when the steering handle is in *horizontal* or *level* position.

To turn the truck to the right, pull the steering handle *up*. To make a left turn, push the steering handle *down*.

Now with your travel motor operating at low speed (with the control lever in the first notch) give yourself a few simple lessons.

Practice moving the empty truck (no load) backward and forward in a straight line, slowly. Never take your hand off the steering wheel or lever.

You can let go of the controller handle and stop quickly by raising your left foot—but don't try to stop too quickly when backing, or the platform end of the empty truck may tend to lift up. If this happens, be calm. It won't lift very high nor throw you off.

Then, try some wide, easy swings to the left and right in the pattern of a long letter "S".

Next, tell yourself that you have drawn a big figure "8" with chalk, and see how well you can follow the whole length of this imaginary line forward and back—making two complete turns with the truck.

Don't be afraid to spend some time on these steering tests. An operator is never an expert until she can take the truck under load around sharp corners, through narrow doors, and along cramped aisles without striking either side or endangering people at work.

And all this time don't forget there's an electric horn button in easy reach.

Intermittent or "Inching" Travel: The instructor will show you how to control the truck under slow-moving operations—as when you are preparing to lift loaded skids or other platforms, or pallets. "Inching" combines the motors, brakes and steering mechanism—to do it successfully calls for the best of teamwork between hands and feet.

To Raise and Lower Platform or Forks: Most power industrial trucks transport their loads either on platforms or forks which are raised and lowered by the power of the truck motors. So your next important lesson is that of picking up, transporting and putting down loads which may range in weight from a few hundred pounds to two or more tons. As a rule, platform trucks handle loads on skids, while fork trucks handle loads on pallets.

You will learn to approach the load; insert the platform or forks under the load; pick up or "elevate" the load—perhaps just a few inches to clear the floor; transport it to the place where it is needed next; lower the load; and withdraw the platform or forks. Practice these until they have become second nature to you.

When tiering, do not apply brakes too quickly, or the truck may tip forward and spill the load.

To raise the load, pull the lift controller handle UP—or push it forward, as the case may be for the type of truck you operate. To stop the hoist motor at any point when either raising or lowering, bring the controller handle to neutral position—halfway between the two extremes. To lower the platform or forks, push the controller handle DOWN or pull it TOWARD you.

If you do not move the controller handle to stop the hoist motor when either raising or lowering, the platform or forks will stop automatically at the extreme top or bottom and the controller handle will return to the original position. An automatic electric brake prevents the platform or forks from moving either up or down, so long as the controller handle remains in neutral.

Tilting the Uprights: Certain trucks in center-control and end-control models carry their pallet or skid-loads on forks, or prongs, instead of platforms. In addition to the hoist motor, fork trucks have a separate tilt motor operated by the tilt-controller handle. By tilting the uprights toward you, the weight on the forks is brought back, keeping the truck in balance and avoiding possible spills.

With the tilt motor you can also lean the uprights slightly forward when necessary to insert the forks under pallets on an uneven floor; or to withdraw them more quickly when building a high tier.

Caution: Never drive a fork truck with the load elevated any higher above the floor than is necessary.

Telescoping Uprights: Certain high-lift trucks and fork trucks are often built with telescoping uprights for the purpose of elevating their loads to an extra height. The upper part of a "telescoper" is built inside the lower section and starts moving only when the truck platform or forks have traveled to the top of the fixed uprights.

Treat the truck with kindness—your boss will need it for a long time! Most trucks now in service cannot be replaced for a good while. In fact they will have to take on still heavier jobs as the volume of war loads is stepped up again and again. You must do everything you can to keep YOUR truck in first-class operating condition.

(*Please turn to Page* 144)

flying for Uncle Sam

PICTURED at left is a radio aerial mast and a heater radiator—both for airplanes and both now serving on planes used by our armed forces.

ARMOR-VIT was specified as the finish for these parts because of its amazing resistance to heat, because it is unaffected by the standard 200-hour salt-spray and is undismayed by accelerated weathering tests equal to 5 years normal weather.

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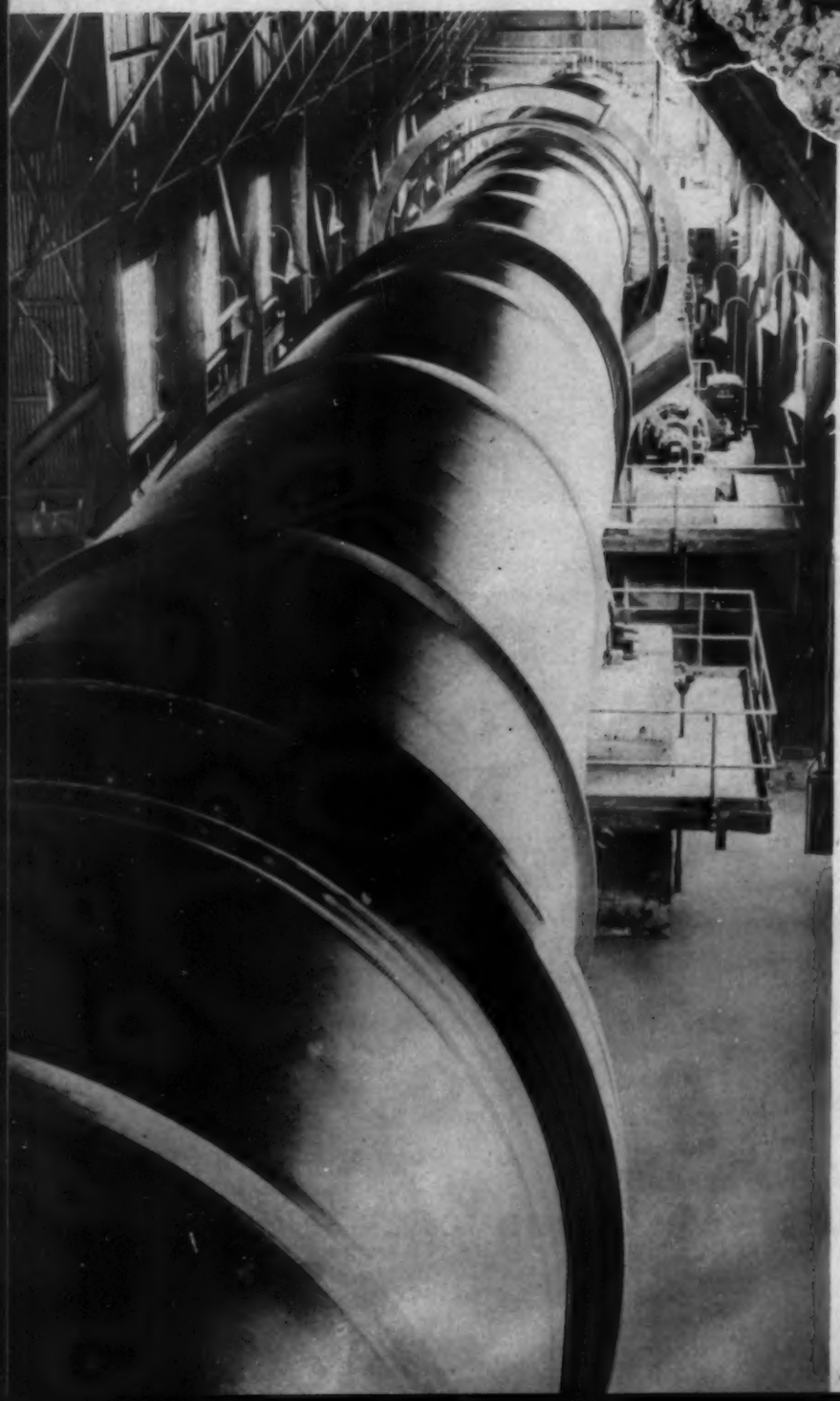
ROTARY KILNS

for

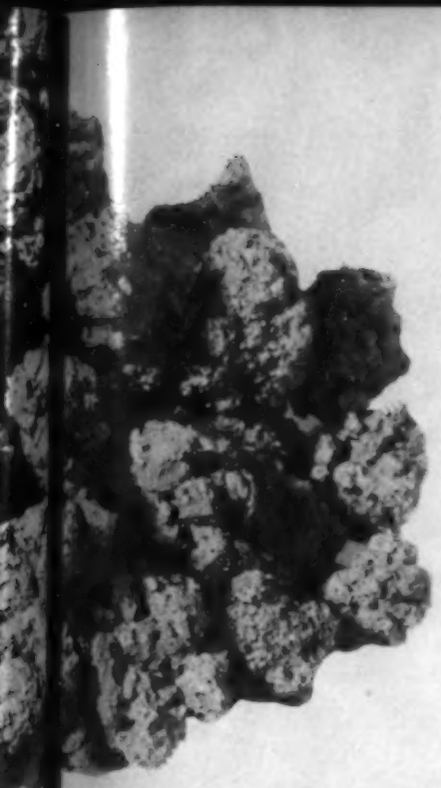
Agglomerating Ores

By S. G. THYRRE
Vice President
F. L. Smidth & Co.
New York



SUBSTANTIALLY increased capacity and improved operation of blast furnace are effected by the use of increased amounts of sintered or nodulized ores. Opinions differ in regard to the optimum percentage of sinter in blast furnace burdens and in regard to the relative merits of sintering, nodulizing or other forms of agglomeration and partial reduction of the ores, but there is hardly any doubt that, under present conditions, the steel industry could to great advantage utilize a considerably larger agglomerating plant capacity than that in operation at present.

This situation has created considerable renewed interest in the use of rotary kilns for these purposes, especially since there are at present a great number of idle cement kilns which might be converted with the use of a minimum of critical materials. Due to curtailment of construction activities as a result of the all-out war effort, the cement production during the current year is estimated to amount to only about 50 per cent of the industry's productive capacity. The total number of rotary kilns installed in the cement plants in the United States is estimated to be close to 700. The kilns vary in diameter from 6 up to 12 feet, and in length from 60 up to 475 feet. There is, therefore, a large number of kilns



Above—Typical iron ore sinter made in rotary kiln

Left below—Rotary cement kiln for nodulizing iron ores

idle at present and which presumably will so remain for the duration.

The question of how this equipment could be utilized to best advantage in the war effort has naturally been given careful attention by government authorities in their efforts to conserve the critical materials which would be required in the construction of new plants. Recently a number of cement plants have been converted, either partly or in full, to various calcining or nodulizing processes, and a further development along these lines may be expected.

The original experience, during the infancy of the rotary kiln, with nodulizing flue dust and iron ore fines was generally considered discouraging from the standpoint of economy and operating efficiency although the nodules produced were found to be satisfactory in the blast furnace operation. The main difficulty encountered was the tendency of the material to adhere to the lining in the hot zone of the kiln causing the formation of "rings" which necessitated frequent shutdowns and otherwise interfered with efficient kiln operation. This is the background on which the development of the various well-known types of sintering machines took place, and on the basis of the lower costs these machines were adopted as more or less standard equipment by the steel industry. However, during recent years, through the experience gained in many different fields, the rotary kiln design and the operating technique have improved to a great extent and units of much larger capacity have been placed in operation. Furthermore, new agglomeration processes have been developed which have greatly facilitated the performance of the rotary kiln.

Today's picture is, therefore vastly different from that of 20 or 25 years ago.

Difficulties Previously Outlined

A few years ago the writer presented before a meeting of the Eastern States Blast Furnace and Coke Oven Association a paper which outlined the principal difficulties encountered in operating plain rotary cement kilns for nodulizing or sintering of ore fines and reported in detail on the special kiln with boring device for mechanical removal of excessive crust on the lining by means of which the difficulties were eliminated*.

Since then, the research laboratory of the Smidth Company has been actively engaged in developing other means for rendering the plain rotary cement kiln suitable for nodulizing. The results of this work have so facilitated the kiln operation that the plain cement kiln may now, with minor modifications, be considered satisfactory for this purpose. In view of present conditions a brief description of this development may be of interest.

The work originated from a series of experiments undertaken at the suggestion of the War Production Board to determine whether it might be possible to produce satisfactory grinding bodies for ballmills to substitute steel balls and thus conserve critical war materials. The experiments were based on the idea of casting the grinding bodies, employing iron ore to which lime or other ingredients had been added in order to obtain the lowest possible melting temperature. The results were negative in that it proved impossible to produce a satisfactory grade of balls, but the experiments gave the incentive to the development of a new process for nodulizing iron ore, for which patent has been applied for. This process is called the "agglomerating method", and was worked out by two of the company's engineers, A. Brix Andersen and K. Horn.

By this method the ore to be sintered is mixed with a certain amount of so-called "agglomerating agent" which has a low melting temperature and the mixture is heated to a suitable temperature whereby the agglomerating agent melts and binds the ore particles into nodules. The agglomerating agent is made from a mixture of iron ore and limestone ground together in a mill, either dry or wet in the form of slurry. It is known that the melting temperature of mixtures of iron ore and lime varies according to the percentage of lime. The melting temperature of pure iron oxide is in excess of 2500 degrees Fahr., and as the lime content increases from 0 to about 15 per cent, the melting point drops sharply to about 3200 degrees Fahr. If the percentage of lime is further increased from about 15 to 32 per cent, the melting point of the mixture remains practically constant. If the amount of lime is increased beyond 32 per cent, the melting point rises again sharply. The agglomerating agent should have as low a melting point as possible and this is obtained by mixing iron ore and limestone in the proper proportions, according to the eutectic curves.

It is further known that all mixtures of iron ore and lime containing between 15 and 32 per cent CaO have a sharp melting point, and the material passes directly from the solid phase to the liquid phase upon passing 2100 degrees Fahr. This is contrary to the behavior of other mixtures where no sharp melting point is encountered, but where the mixture gradually becomes softer and softer as the temperature rises until the whole mixture is melted.

Agent Finely Ground

In one form of the agglomerating method for nodulizing of iron ore the agglomerating agent is finely ground and fed together with the ore into the rotary kiln. The ore and the agglomerating agent will, during its passage through the rotary kiln, be mixed and heated to a temperature that is above the melting point of the agglomerating agent, but is lower than the melting point of the ore. The agglomerating agent will, therefore, melt and bind the iron ore particles together forming the nodules. The nodules are discharged from the kiln and immediately upon cooling to below 2100 degrees Fahr. they become hard and strong and can be handled and further cooled by ordinary mechanical means.

In order that this method may operate successfully, it is necessary that the melting point of the agglomerating agent is considerably lower than the melting point of the ore to be agglomerated. This condition is fulfilled for all ores having less than about 15 per cent or more than 32 per cent of lime content, calculated on the weight of the total mixture. Most high grade ores will have considerably less than 15 per cent of lime and would, therefore, be suitable for treatment according to this method.

A number of ores have been agglomerated according to this method in a small rotary kiln and ordinarily the percentage of agglomerating agent has

*"Modern Practice in Rotary Kiln Sintering", *Blast Furnace and Steel Plant*, March 1941.

amounted to about 15 per cent of the weight of the ore. It is evident from all the tests that this method has great advantage as far as the formation of excessive coating or rings on the kiln lining is concerned as compared with nodulizing of ore without any admixtures. It was observed, however, that if the temperature rises to a point where the ore itself becomes sticky, the coating in the kiln becomes heavier and the nodules become dense. If on the other hand the temperature falls too low, the nodules tend to become small, spongy and not strong physically. It is clear, therefore that in practice it is important to keep a careful control of the temperature of the material in the hot zone of the kiln.

Government Employs Process

Experience acquired during the many tests carried out with the agglomerating method, has been placed at the disposal of the government which has recently tried it out on an industrial scale at a cement plant in the East.

The foregoing description covers one modification, the so-called "premixing method" of agglomeration. Another modification is the so-called "premelting method", according to which the agglomerating agent is melted in a separate device. The premelting method is a new development which has shown promising results in the laboratory, but which has not yet been demonstrated industrially. According to this method the ore is fed into a nodulizing drum in which it is heated to a temperature below 2100 degrees Fahr., and the molten agglomerating agent is sprayed on the ore and by the rotation of the nodulizing drum the nodules are formed. This resembles the well-known method of producing nodules from pulverized materials in a rotating drum by the addition of a small amount of water. In this case the iron ore fines take the place of the pulverized material and the liquid agglomerating agent takes the place of the water. This method can be used for all types of ore and should be particularly applicable for ores containing in excess of 15 per cent of lime. By the premelting method the ore is heated only to a comparatively low temperature so that a low-fuel consumption is to be expected. Before attempting large scale installations it would be advisable to go in for a pilot plant. To erect a pilot plant under the present circumstances would be a comparatively simple matter since available second-hand materials could be used to a great extent.

Another method for obtaining improved nodulizing in rotary kilns has been developed by H. P. Reid of Universal Atlas Cement Co. and this method is based on the addition ahead of the kiln of crushed limestone to ores which are low in lime. This method is now in practical use at several cement plants and patents have been applied for.

While conditions in the rotary kiln are clearly improved when employing these various methods, it should be emphasized, however, that it is still of great importance to maintain careful kiln operation by endeavoring to obtain uniform feed to the kiln, uniform draft and fuel supply, uniform and relatively high speed of the kiln and proper instrumentation.

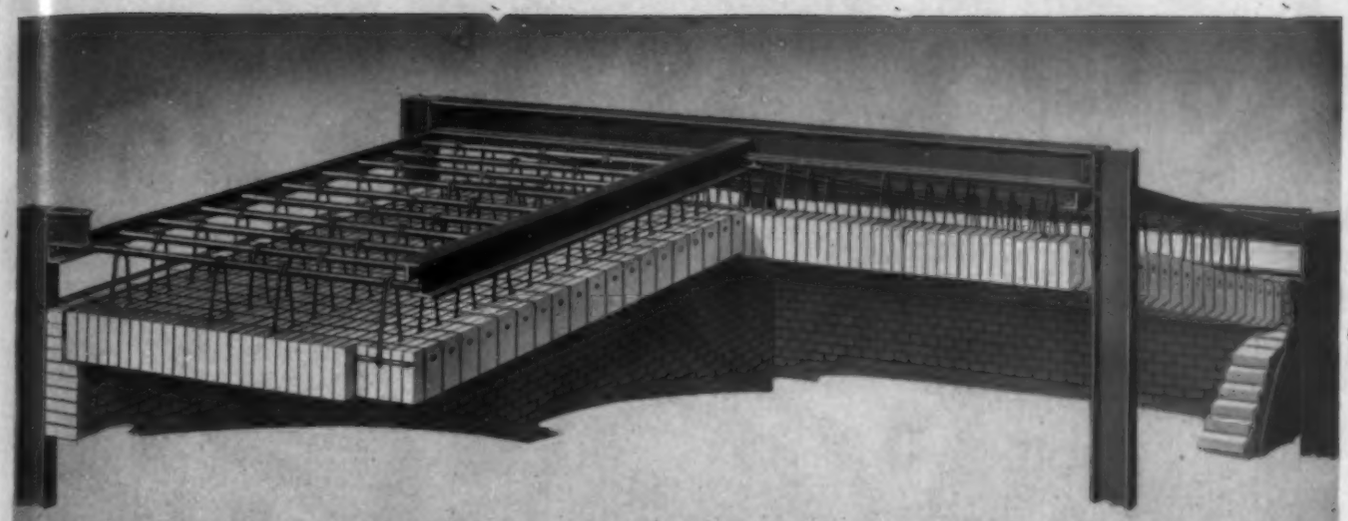
Rings Form Occasionally

Employing existing cement kilns, many of which are out-of-date and no longer in satisfactory mechanical condition, it may be expected that in spite of all precautions, occasional ring formation will take place, and it will no doubt be advisable to provide emergency equipment for removal of such rings. With the agglomerating method it has been observed that when rings do form they are of a light and spongy structure and are easily removable. When nodulizing is attempted in plain rotary kilns without use of the new processes the rings are normally hard and of dense glassy structure. The removal of such rings is difficult requiring special facilities. Lately various methods have been successfully used for this purpose, such as the Cliffe method which employs special carbon dioxide cartridges applied at suitable points on the kiln shell. This method has previously been discussed in trade magazines.

In this connection it should be mentioned that the presence of from 2 to 5 per cent of carbon in the feed to a nodulizing kiln normally improves the general performance of the kiln and makes it possible to obtain a substantially increased output. The presence of carbon is particularly important if low B.T.U. fuel, such as blast furnace gas, is used for heating the kiln. Where iron ore fines and flue dust are nodulized, the two materials may be proportioned in such a way as to provide the desired carbon content; where only iron ore fines are nodulized the carbon is added in the form of low-cost carbonaceous material, such as coke breeze or coal screenings. Advantages of carbon in the feed have been known for many years and the additions of carbonaceous material have been employed for kilns nodulizing iron-bearing materials, as well as other ores, operating either on the dry or the wet process. The research laboratory of the Smidth company along with its general research on

(*Please turn to Page* 131)

CABLE REELS VIA SPECIAL DELIVERY: Pallets made especially to handle cable reels are saving time and storage space at General Electric's Schenectady Works. Prior to this, reels were moved by overhead crane, and required more space for storage inasmuch as they could not be stacked on top of one another



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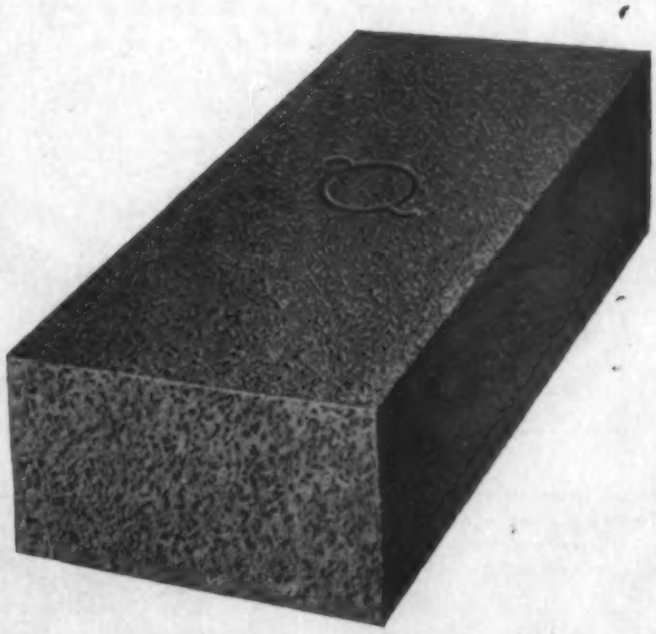

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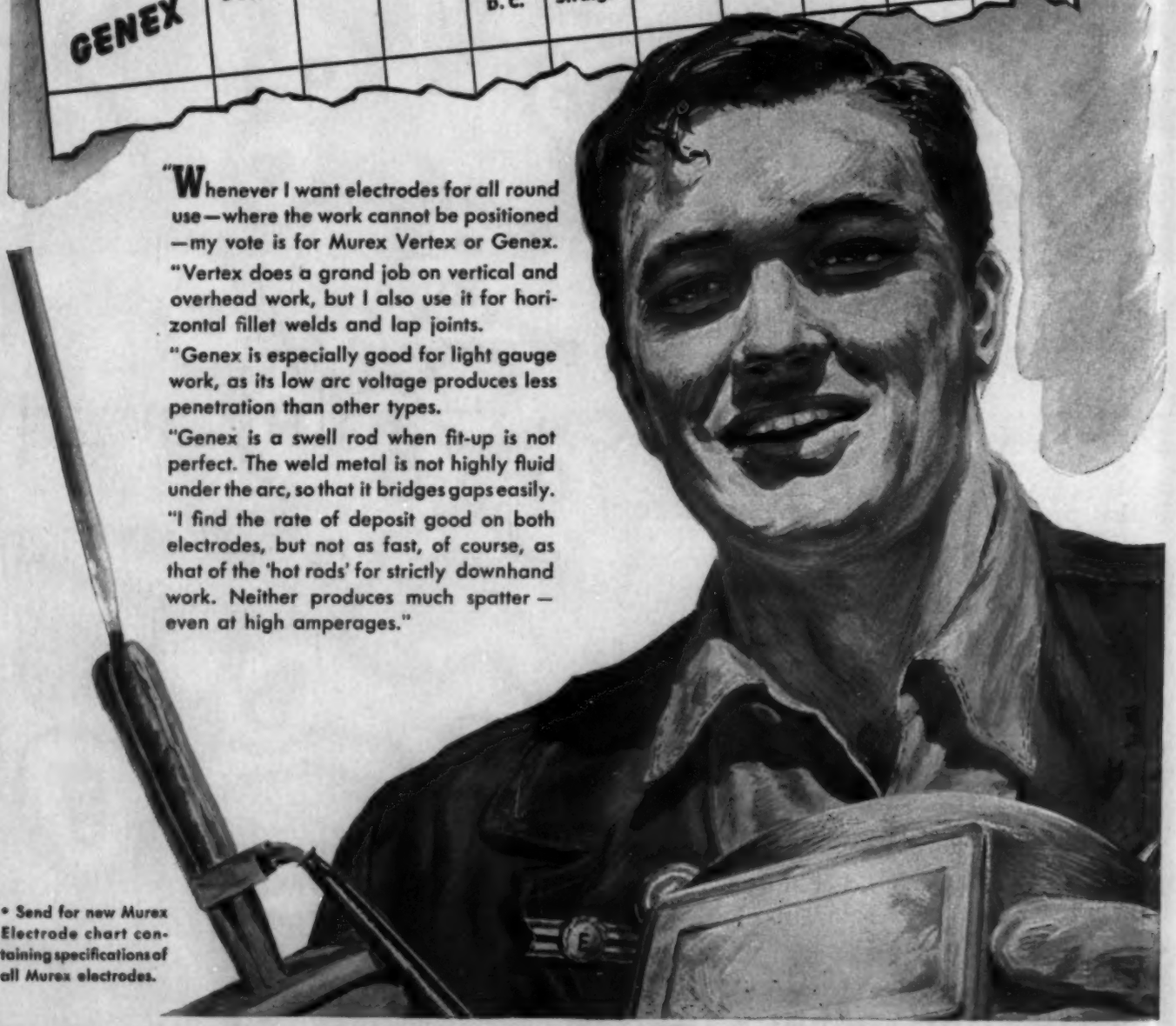
MUREX ELECTRODE	AWS-ASTM Class	IDENTIFICATION		Current	POLARITY		TENSILE STRENGTH OF DEPOSIT		ELONGATION OF DEPOSIT IN 2"	
		Color Of Coating	Color On Tip		Groove Welds	Fillet Welds	As Welded (p.s.i.)	Stress Relieved (p.s.i.)	As Welded %	Stress Relieved %
VERTEX	E-6010	Gray	None	D.C.	Reverse	Reverse	62,000 to 70,000	60,000 to 66,000	22 to 30	27 to 34
GENEX	E-6012	Tan	None	A.C. or D.C.	Straight	Straight	68,000 to 80,000	65,000 to 69,000	17 to 25	22 to 26



"Whenever I want electrodes for all round use—where the work cannot be positioned—my vote is for Murex Vertex or Genex.

"Vertex does a grand job on vertical and overhead work, but I also use it for horizontal fillet welds and lap joints.

"Genex is especially good for light gauge work, as its low arc voltage produces less penetration than other types.

"Genex is a swell rod when fit-up is not perfect. The weld metal is not highly fluid under the arc, so that it bridges gaps easily.

"I find the rate of deposit good on both electrodes, but not as fast, of course, as that of the 'hot rods' for strictly downhand work. Neither produces much spatter—even at high amperages."

• Send for new Murex Electrode chart containing specifications of all Murex electrodes.

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Precision Gears

. . . . made on standard equipment

WIDELY regarded as a "pilot" plant in the mass production of the specialized precision gears required for military combat vehicles—particularly tanks—the gear department of the Mack Mfg. Co. is also notable for its adaptation of well-known automotive mass-production equipment to its specialized problems.

Even though the accuracies required in gears for such vehicles far exceeds normal requirements—as in trucks or automobiles—it has been by production control and correlation of equipment rather than by new production processes that the desired results have been achieved. The net result was not only a minimum of delay in achieving large scale production, but also an exceptionally high degree of consistency in operating results.

The general process in producing gears at this plant starts with rough forming the blanks—using largely Carboloy cutting tools on Bullard Multaumatics.

Internal splines in gears are produced by broaching, using two types of Colonial machines. For smaller gears a Universal horizontal machine is used, while for the larger ones a Colonial pull-down type of machine is employed, for the extremely long and heavy broach required for the larger gears is less likely to sag on a vertical rather than a horizontal machine.

Wherever possible, gears are hobbed. This is done in two steps—rough and finish hobbing, leaving about 0.035 to 0.040-inch for finish hobbing. About 0.001-inch is left after finish hobbing to be cleaned up by shaving.

Contrary to the usual practice of using class *B* hobs for finishing prior to shaving, Mack employs class *A* hobs. The reason is that accurate top hobbing is required for ease of chucking when grinding the bore of the gear.

Some types of gears not lending themselves readily to hobbing are finished by shaper cutting. This includes, particularly, herringbone types—although some others are produced on shapers. Wherever possible, shaper cut gears are subsequently finished by crossed-axis shaving.

Finishing of gears is carried out on a battery of Michigan 860 type rotary gear finishers, some of these being equipped with special extension heads for shaving of gears on relatively long shafts. In general, gears are held to 0.0002-inch as they come off the finishing machines and before heat treating.

The crossed-axis angle selected for shaving gears is determined to some extent by the character of the steel. Gears are actually shaved off of the true lead angle to compensate in advance for subsequent heat-treat distortion.

Cutter design on the shaving machines is such as to not only finish the tooth form accurately and give the desired lead angle, but also to put the "tool marks" in line with the plane of rotation for maximum gear life.

After heat treatment, gears are quenched in Gleasons and sample lots from each heat are checked on "Spine-Line" machines for lead angles as a check on heat-treat distortion characteristics.

Included in the gear checking equipment provided is a Michigan "Sine-Line" involute checker. This instrument is used mainly when trouble develops and it is necessary to locate the source of the difficulty. Thus the lead checker is used as a production control instrument, while the function of the involute checker is largely a laboratory one. Approximately 5 per cent of all gears are machine checked in production.

After heat treating, gears are matched in pairs and run for a few seconds on a Gleason lapping machine mainly to check the relationship of matched pairs. Thus these lappers are used in effect as production checking machines. While on these machines, high spots of interference — as may be caused by damage in handling — are readily identified and later corrected.

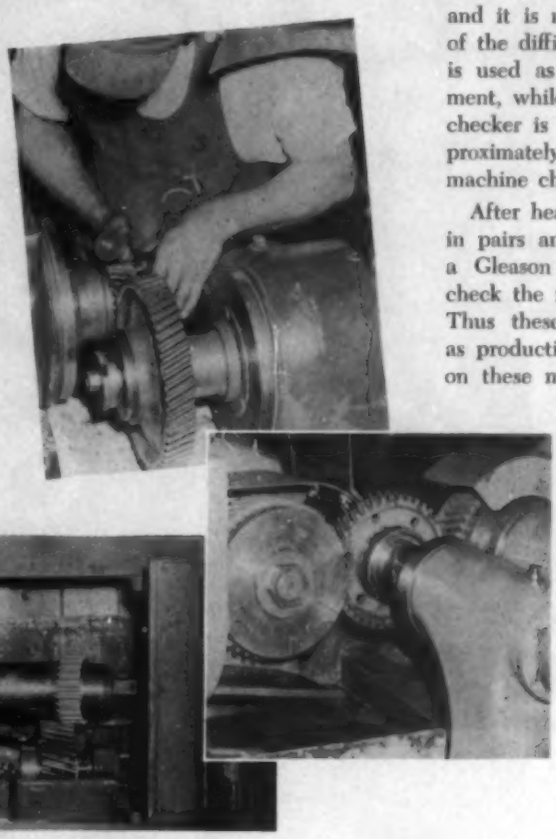
Most of the touch-ups of this nature are naturally on the corners of the teeth and consist in removal of minor burrs, etc.

From here the gears go to Michigan Duplex type lappers. The operation of these machines is such as to produce a small amount of crowning—just enough to insure a good bearing even though there may be minor variations in assembly alignment.

The entire setup is extremely flexible in character and is so designed that lots of gears of different kinds can follow each other through. Each time the setup is changed, it is accurately checked of course as the gear goes though.

Pilot machines of the entire line are the lappers. Here a close watch is kept for tooth contact and any deviation is immediately traced right down to its very source.

Before assembly, all gears are pin-checked, while there is also a 100 per cent check of gear pairs for correct center distance, etc.



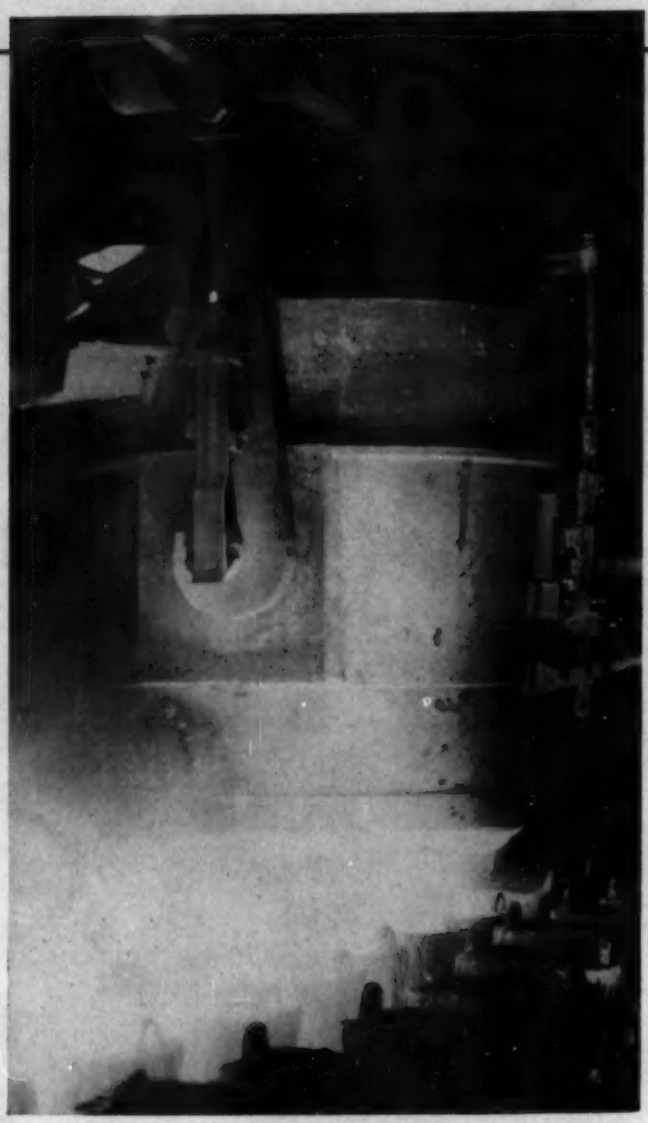
Above—After heat treatment, burrs due to operations are removed on this gear matching machine prior to lapping

Lower left—This Michigan 860 rotary gear finisher with extension head is being used for the high precision finishing of a spline on a heavy-duty transmission shaft. The method employs crossed-axis shaving

Lower right—Lapping a tank gear on a Michigan duplex lapping machine. A slight amount of crown is produced and carefully controlled to protect the gear against the effect of possible minute variations in assembly alignment

THE STANLEY WORKS

"Gets in the Scrap"



Keeping these ladles at the Bridgeport, Conn. mill full of molten steel is the job of the cleanup and salvage program undertaken by the Stanley Works. First-hand knowledge of seriousness of scrap needs got this company off to a head start in getting the most out of its waste

WE AT the Stanley Works have had an experience in the salvaging of materials during the past few months which confirms our belief that American industry need but put its collective shoulder to the wheel to solve an acute material problem which threatens war production.

It is now a well-known fact through the country that steel mills and foundries are maintaining operations with their stocks of scrap metal at such a low ebb that it has been impossible for them to accumulate a reasonable inventory. This hand-to-mouth condition is so serious in many places that the supply on hand would be exhausted in a few days were it not replenished.

Our experience indicates that there are probably many thousands of tons of iron and steel scrap in the form of obsolete equipment and parts in plants that have not yet been contributed fully to scrap piles because of the lack of consciousness of how serious the scrap shortage really is.

New England—particularly that section which included Connecticut and Rhode Island—for many years has been considered as a reservoir for scrap metal. New England plants contribute scrap on a per capita basis far in excess of the average for the nation. Mills and foundries logically look to this area for vast tonnages required to meet the needs of war.

Perhaps the fact that we operate a strip steel rolling mill in Bridgeport which consumes approximately 7500 tons of scrap iron and steel each month made us more quickly conscious of the impending shortage when the flood of war orders first started. H. A. Page, purchasing agent in our Bridgeport plant, was aware of the situation "early in the game" and made a special trip to New Britain to urge the management to authorize a cleanup program in our plants.

From an interview with
E. W. CHRIST
Vice President
The Stanley Works
New Britain, Conn.

First to go into the discard for scrap was a building which had not been used for about 20 years. Factory superintendents and foremen were then asked to get the job of a wholesale housecleaning under way. A great stock of cast iron and steel found its way to the Bridgeport mill.

It was after this general cleanup that Frank L. Conlon, superintendent of factory transportation, came into the picture. Because his daily duties took him to all parts of the New Britain plants, he was ideally suited to become salvage manager for the Stanley Works. Accordingly he was given wide authority to suggest the scrapping of equipment, dies, tools and other items not in use.

Within 10 weeks, Frank Conlon had shipped 500 tons of scrap back to the mill. Tool cribs were surveyed; old equipment not in use was junked; officials and employes were warned to be on the watch for every pound of idle metal that could be put to use. Old spur tracks were torn up; lockers were cleaned out. A scrap and salvage committee was made a permanent part of the plant organization and was charged with making periodical inspection trips through the plants in search of scrap.

One of the primary considerations was to give the salvage chairman complete authority to act. He is backed up by the fullest co-operation of the plant management. Results have verified the importance of these factors in an industrial salvage campaign. Prior to the time of

(*Please turn to Page* 132)

SPEEDS UP when controlled by . . . . . .

Diebold *Cardineer* Rotary File

Cardineer's removable segments permit easy division of work for peak loads.

Ask for yours

Studies in time-money saving are available as follows; check and pin on your letterhead: Inventories ☐, Costs ☐, Payroll & Personnel ☐, Plant and Equipment ☐, Purchases ☐, Production ☐.

Yes sir! It's happening right along. That line on the production chart starts a sharp upward climb when Cardineer is installed. In hundreds of factories Cardineer is providing better control of materials and stepping up the volume of finished goods. Built on the wheel principle, Cardineer puts 6000 cards instantly at hand. Saves 40% to 60% or more in the time devoted to record keeping. And you can have Cardineer immediately. Wire, phone or write today.

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INDUSTRIAL EQUIPMENT

Identifying Unit

American Tubular Elevator Co., Neville Island, Pittsburgh, is offering a new electrical instrument called the Identometer for identifying instantly and accurately, by the use of reference specimens, any ferrous alloy.

Provided with a reference specimen, it makes possible the classification of "unknown pieces" or lots of steel according to: Heats (identical analysis), grades (similar analysis), types (dissimilar analysis), heat treatments (identical analysis with dissimilar structure), and composite types (two and three plys, clad metals, shear knife, etc.).

To operate the unit, a known sample is affixed to one of its two clamps and the unknown specimen to the other. When the two pieces of metal are brought into contact, the lighted indicator registers on a scale whether or not the two are of the same chemical analysis.

The machine is about the size of a

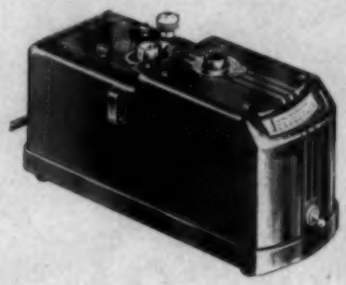
small enclosed radio and can be used in a laboratory or in shops, warehouses, freight cars, etc. Extreme simplicity of operation makes it adaptable for use by personnel without exceptional skill. It can be used to identify metals in any stage of their working from the ingot onward if cooled to room temperature. The Dravo Corp., 300 Penn avenue, Pittsburgh, is in charge of distribution.

Photelometer

Central Scientific Co., Chicago, is introducing a new type B-2 photelometer of smaller size for industrial use. Its sensitivity and accuracy are sufficient for most laboratory determination.

The photelometer is a compact filter photometer for chemical analyses in the routine or control laboratory. Molybdenum, titanium, vanadium, or manganese in steel, lead, copper, iron or vitamins in foods are a few typical determinations to which this unit lends itself.

The photelometer is easily standardized by determining the transmittancies of a number of solutions which are prepared in accordanace with a specific chemical procedure. The transmittancies when plotted on a semi-logarithmic scale against the known concentrations on a



linear scale yield the analytical curve or standard with which unknown solutions of that technique may be compared.

The barrier-layer instrument consists of basically a low voltage light source, an adjustable light aperture, a 3-color filter holder, receptacles for tubular or rectangular absorption cells, a single photoelectric cell, and a sensitive current measuring instrument with a 2½-inch scale. The scale reads from 0-100 in 50 divisions. A voltage transformer to supply constant intensity of light when operated on a controlled frequency power line is furnished with the 115-volt alternating-current instrument.

Humidity Test Chamber

American Coils Co., 25 Lexington street, Newark, N. J., announces a new humidity test chamber which features an automatic humidity control. The unit, known as model RTC-1H, embodies, as an integral part, equipment for mechanical refrigeration and electric heating which afford an unusually fast rate of temperature and humidity change. Its temperature range is —55 degrees Cent. to +70 degrees Cent.

Other features includes the use of a 2-stage Freon condensing unit and special refrigeration accessory developments that make possible extremely flexible operation at various loads and temperatures. Positive forced-air circulation, the company states, can be varied in volume and temperatures with thermostatic control in making tests on delicate mechanisms and precision equipment. Observation of products under test is provided by a door having five sealed and dehydrated panels of glass 46 x 21½ inches. The steel frame door has a clear opening 51½ x 26½ inches. Access electrically or mechanically to the test space for equipment is arranged conveniently.

Rivet Sorters

Engel Aircraft Specialties, Escondido, Calif., reports a line of sorters for sorting rivets, screws or bolts by length, head or diameter.

According to the company, the machines in the line can do rough general

sorting of screws, bolts and rivets of either Dural, steel or other metal alloys, or can be developed to do fine breakdown work of those products. Machines are being offered in capacities of 50 to 200 pounds per hour, depending upon the operation.

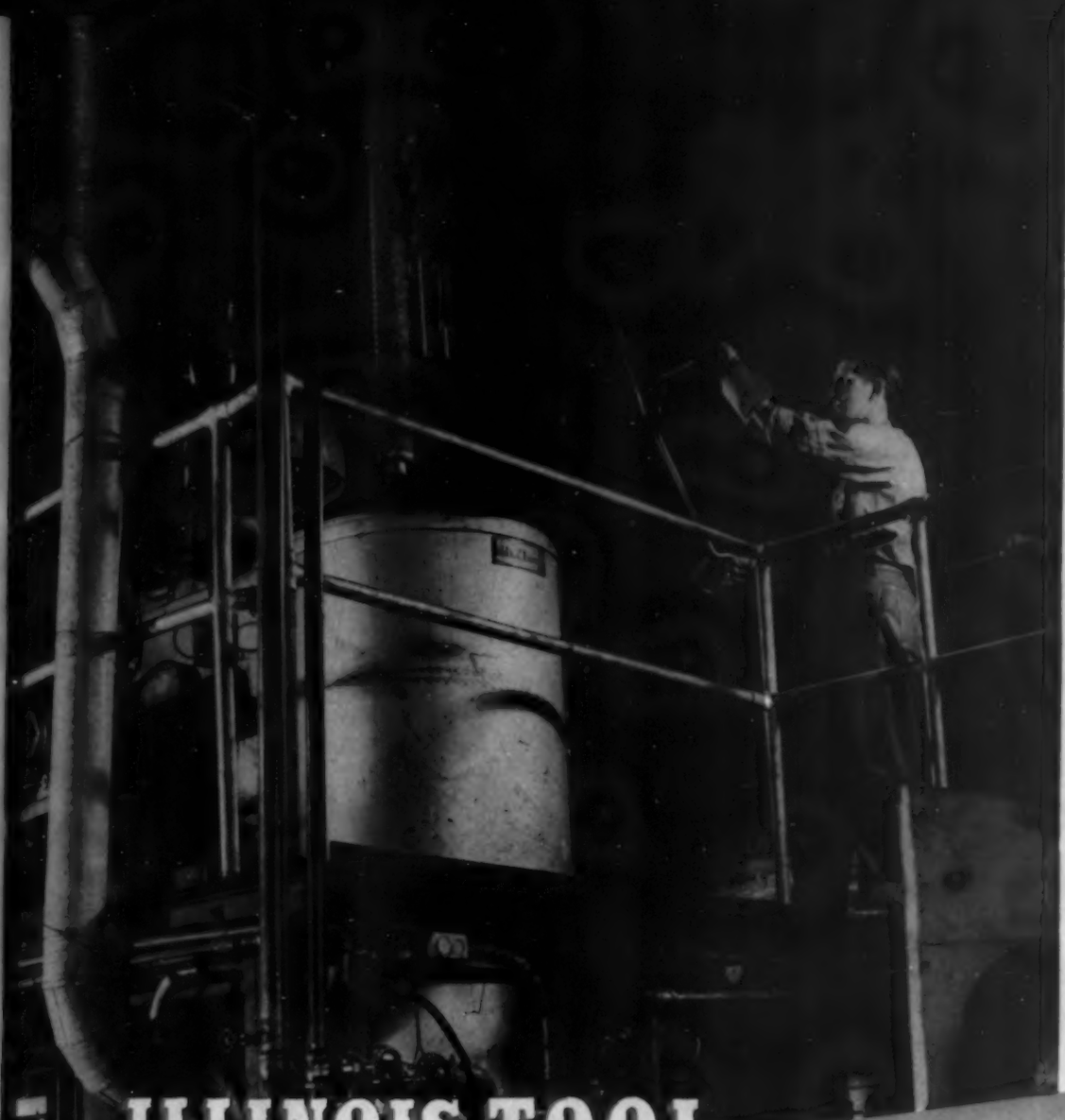
Coil-Turn Counter

General Electric Co., Schenectady, N. Y., recently introduced an improved precision coil-turn counter for laboratory or factory use in determining with precision number of turns in wound electric coils. Employing the same circuit as a former model, it is more compact in design and incorporates a magnetizing current control box which greatly simplifies installation.

The counter is capable of checking or determining the effective turns of coils ranging from 1 to 11,110 turns, at a rate of from 80 to 100 coils of like specifications per hour.

In addition to the magnetizing current-control box, the new coil-turn counter comprises a portable light-beam galvanometer, two yoked test rods, a galvanometer control panel, and a foot-operated switch—all assembled for operation on a table or bench.

Operation of the counter is simple, it is claimed. The coil to be tested is placed over the test rod and connected



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Broaches being lowered into the furnace for tempering.

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● Modern facilities, technical skill and practical experience in the application of heat contribute greatly to the outstanding performance of Illinite cutting tools. Through precisely controlled heat treatment, each tool is rendered structurally strong, permanently accurate and able to give exceptionally long service. These effective qualities, which asssure increased economy and efficiency in production, are important reasons for calling in "Illinois Tool."

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ILLINITE { HOBS • BROACHES • SHAPER CUTTERS • GEAR CUTTERS MILLING CUTTERS • GROUND FORM TOOLS • SPECIAL TOOLS

to test clips. The dials on the galvanometer control panel are set to the number of turns the coil should have, and the foot switch is pressed. If the galvanometer dial shows a deflection, the dial readings are increased or decreased until the deflection is zero. The dial reading is then the number of turns. When probable number of turns in a coil is not known, a trial reading is taken and the dial is adjusted until the reading is zero on the galvanometer.

Instead of being mounted separately, the reference coils of the new counter are enclosed in the galvanometer control case while the test rods are mounted on the case. The magnetizing circuit is designed to operate from a 120-volt direct-current supply.

Hose Clamp

Aircraft Standard Parts Co., 1711 Nineteenth avenue, Rockford, Ill., recently introduced new Aero-Seal hose clamps which feature rapid action, through a ten-pitch thread, so full take-up is obtained with only a few turns of the screw driver. These are being offered in 14 sizes, from ¾ to 4 inches inside hose diameter.

Each clamp consists of a 9/16-inch tempered steel band punched with holes corresponding to the teeth of a worm gear. The holes mesh with a worm in the housing welded to the fixed end of the band. The worm is turned by a screw driver, and the screw head on the worm is fitted with a safety cup which prevents the screw driver from slipping and puncturing the hose or damaging other equipment.

According to the company, the belt-like tightening action produces a uniform tangential pull which does not distort the pipe and results in a leakless clamping action. By backing up the screw, the free end of the band comes out of the housing, and the clamp may then be sprung open and slipped over the hose in place on the pipe.

Clamps are self-locking as a result of the worm and worm gear action and are virtually impossible to loosen even with severe vibration as long as the band is under tension, it is reported.

Temperature Controller

Bristol Co., Waterbury, Conn., is offering a new temperature controller which incorporates in a single instrument all the equipment needed to control automatically the temperature in polymerizers used for polymerization of butadiene and copolymers such as styrene or acrylonitrile.

The instrument controls the complete polymerization process automatically, including the heating and cooling cycles, and is designed to eliminate overshooting

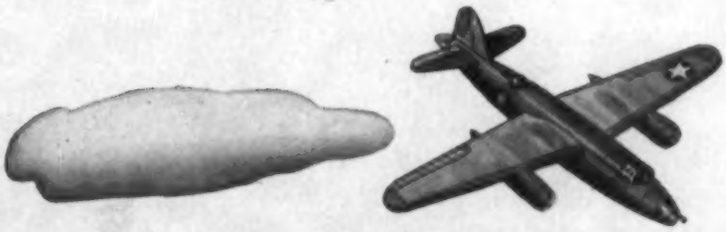
Come to *DISSTON* for ORDNANCE QUALITY STEELS

Standard Alloy Steel for Airplane Parts

is made by modern tool steel practice in Disston electric furnaces under precise controls and expert supervision. Experience and facilities at Disston combine to produce Aircraft Quality steels of exceptional soundness and cleanness.

Standard Alloy Steel of Gun Quality

as produced by Disston in electric furnaces is proving highly satisfactory for automatic rifle and torpedo parts, and for 37 m/m shot and gun barrels. Disston methods and standards result in superior steel of this type.



THE DISSTON TECHNICAL STAFF is at your service without obligation for metallurgical and engineering cooperation on any problems concerning Ordnance Quality steels. Write fully to Henry Disston & Sons, Inc., 726 Tacony, Phila. 35, Pa., U.S.A.

of the control point as the temperature reaches the control setting as well as controlling the temperature at the desired value during the reaction cycle. According to the company, the instrument is a recording air-operated controller.

Inspection Light

Curtis Lighting Inc., 6135 West Sixty-fifth street, Chicago, is offering a new inspection light—one that is essentially a magnifying lens with auxiliary lighting. The unit consists of a steel housing 12⅝ inches in diameter and 2 inches deep,

and is furnished with a white Fluracite reflecting surface inside. All outside surfaces are finished in crackled gray.

The magnifying lens of the unit is of the double convex type, 4 1/32 inches in diameter. The shatter-proof cover glass of the light is lightly sanded for diffusion except for a clear spot 3¾ inches in diameter directly under the lens. A swivel base and movable arm permit adjustment of the unit over the inspection plane for correct focusing of the objects to be inspected.

Motor Starter

Allis-Chalmers Mfg. Co., Milwaukee, announces the addition of a new type H motor starter for severe service. It is a metal-enclosed structure similar to a metal-clad switchgear.

High interrupting capacity disconnecting-type fuses are utilized in combination with a heavy-duty oil switch in the new starter. It can be used for both induction and synchronous motors rated up to 1000 horsepower at 2300 volts and 1750 horsepower at 4600 volts, 3-phase 60 or 50 cycles. Usages of the starter cover: Full or reduced voltage starting, dynamic braking, reversing and special applications.

Fuses operate only under actual short circuit conditions and will not blow unnecessarily.

Fire Extinguisher

General Detroit Corp., 2200 East Jefferson avenue, Detroit, is offering a new C-D Fog Underwriters' approved carbon-dioxide fire extinguisher which is said to literally freeze fire.

The carbon-dioxide discharge of the

extinguisher, it is said, kills fire in a few seconds by penetrating to every corner where fire exists, excluding and replacing the oxygen necessary to combustion. Being a nonconductor, the contents of the extinguisher may be discharged safely on live electrical equipment.

Fires in oils, greases, flammable liquids also are quickly controlled. According to the company, the development leaves no "after fire mess". The discharge leaves no trace on the finest mechanism or material.

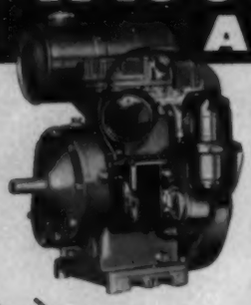
Air-Speed Control

Ross Operating Valve Co., 6474 Epworth boulevard, Detroit, is offering a new air speed control valve which provides and maintains accurate split-second timing of piston movements. It provides

a greatly increased range of selective speeds through a vernier-like adjustment mechanism. A specially designed stem and floating bevel seat poppet of the valve maintain a positive steady control at any selected speed.

TIMKEN ROLLER BEARINGS
in a SINGLE CYLINDER ENGINE?

Certainly — if it's a
WISCONSIN
AIR-COOLED ENGINE



No Wisconsin Engine, so far as we know, has ever had a case of "Bearing Failure." Basically, this is an end result of using Timken Roller Bearings at both ends of the crankshaft. Normally, small engines are not provided with this safeguard . . . but every Wisconsin Engine, whether single cylinder or 4 Cyl.; 1 hp. or 35 hp., has this heavy-duty service protection.

This is a typical example of Wisconsin Air-Cooled Heavy-Duty Engine design and construction . . . geared to maximum utilization of power-operated equipment.

WISCONSIN MOTOR
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MILWAUKEE, WISCONSIN, U. S. A.
World's Largest Builders of Heavy-Duty Air-Cooled Engines

№ 170 TYPE DEOXIDINE

For GREATER EFFICIENCY
in Preparing Steel and Aluminum Ordnance Parts
For Varnish and Paint Finishes...

DEOXIDINE #170, admirably suited to the processing of steel shell cases, is but one of a number of grades of ACP acid cleaners. The immersion process in which it is used is adaptable to the cleaning of many other ordnance or marine parts. Other grades of DEOXIDINE are available for brush or spray processes where these are indicated for expediting production.

DEOXIDINE #170 is a chemical that removes light oil, annealing scale and eradicates rust and rusters, producing a clean, minutely-etched, paint-receptive surface. The rusters, even though invisible, are destroyed, eliminating the possibility of defects developing beneath the protective finish. DEOXIDINE does not produce a coating on the cleaned surface which on shell cases, for example, might crack in crimping and in obturation and ruin the protection of the final finish.

DEOXIDINE meets U.S. Ordnance Department requirements for its efficiency in removing rust and neutralizing rust producers before protective finishes are applied.

CHEMICALS ACP PROCESSES

Manufacturers of Inhibitors & Metal Working Chemicals

AMERICAN CHEMICAL PAINT CO.
AMBLER ACP PENNA.

Send today for Deoxidine #170 Pamphlet showing how simple it is to use.

*Name*_____

*Position*_____

*Firm Name*_____

*Address*_____

F-7

A REAL WORK-MOVING

"Jack-of-all-jobs"

Paul Ehrhardt, Ehrhardt Welding Co., McKeesport, Pa., welds for Victory during the day... teaches welding at night on his Westinghouse All-purpose A-C Welder.

SAYS JOB SHOP OPERATOR OF HIS

A-C WELDER

Like most every other job shop operator, Paul Ehrhardt is swamped with jobs he never did before. Things people used to throw away, he now welds for further service . . . tractor cleats, sprockets, gears, housings, levers, lawn mower parts, etc. In addition, he fabricates parts for war industry, and at night teaches welding . . . a schedule that leaves no leeway for gadget-fussing or time out for maintenance. For that kind of service he switched to a-c welding.

From his Westinghouse All-purpose A-C Welder he gets the speed he needs—20% to 30% faster welding. He has no arc blow or maintenance to contend with, and he can turn out consistently better welds. Add to that, ample capacity for all types of job shop work, lower first and operating costs, simplicity of control, availability, and you have Mr. Ehrhardt's reasons for selecting the Westinghouse A-C Welder.

Before adding to or replacing present equipment in your shop, look into Westinghouse A-C Welders. Ask your Westinghouse Distributor or write for A-C Welding Booklet B-3136, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., Dept. 7-N.

J-21279

EXAMPLE:

FABRICATES war products... makes vacuum-tight welds on housings for vacuum systems using Westinghouse DH and SW electrodes.

EXAMPLE:

MAINTAINS vital equipment. Hard-facing tractor cleats with Westinghouse Hardentough electrodes lengthens cleat life 3 to 5 times.

EXAMPLE:

REPAIRS cast steel bulldozer drive sprockets. Break was burned out, pre-heated and welded with Westinghouse FP electrodes.

Westinghouse

PLANTS IN 25 CITIES... OFFICES EVERYWHERE

A-C WELDERS

Rotary Kilns

(*Concluded from Page* 118)

nodulizing has made extensive experiments with coke and coal additions to ores to be nodulized.

It should be emphasized that from a cost standpoint the use of existing cement kilns for agglomeration of iron ore will not be competitive with modern kiln equipment of large capacity, specially designed for this purpose.

Briefly, the advantages of the modern rotary agglomerating kiln are as follows:

1. Strong nodules with a minimum of fines, highly suitable for blast furnaces as well as for open-hearth furnaces.

2. Flexibility in operation. No specific requirements as to moisture, carbon, fineness, or chemical composition of the kiln feed. Concentrates in the form of pumpable slurry may be fed directly to the kiln.

3. Low fuel consumption and reduced nodulizing temperature. Any fuel available at low cost may be used.

4. Low power consumption due to absence of high vacuum exhausters. Ordinarily, between 7 to 8 kilowatt hours per ton of nodules.

5. Low labor cost. As a rule only three operators per shift required and they are able to take care of several large kilns.

6. Practically speaking, the kiln operation is free from dust, which is advantageous not only as regards direct saving but also from labor standpoint.

7. Low maintenance cost. The machinery is of rugged nature and both mechanical repair cost and the firebrick consumption are low.

Improved operation and increased capacity of blast furnaces may be obtained by the use of nodulized iron ore fines. New processes for agglomeration in rotary kilns have been developed which greatly increase the capacity and improve the operation of plain rotary kilns for nodulizing. With these processes it will be possible to utilize idle cement kilns for nodulizing. These processes, in conjunction with large capacity rotary agglomerating kilns of special design, offer promises of substantial reductions in the first cost as well as the operating cost.

Radiography Symposium

Symposium on Radiography, cloth, 256 pages, 6 x 9 inches; published by the American Society for Testing Materials, Philadelphia, for $4.

This volume includes 18 technical papers presented by outstanding authorities at the thirty-ninth and forty-fifth annual meetings in 1936 and 1942. The larger part of the book consists of the 1942 papers but an important part is devoted to the 1936 papers, which have been revised or condensed.

The volume is the work of a special group of ASTM committee E-7 in radiographic testing. The symposium has as its basic purpose the development of better understanding of radiographic tests and their significance, on the part of both consumers and producers of materials.

Aircraft Generator Brush Life Extended 50 Times

Life of carbon brushes for its aircraft generators has been stepped up from an average of 2 hours to well over 100 hours for high-altitude flying over 30,000 feet, according to Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. This performance is due to a new method being used of treating the brushes, it is said.

At ordinary low-altitude flying standard brushes gave satisfactory operation, but above 30,000 feet the thin air and lack of moisture caused the brushes to wear rapidly, and in many cases to give out entirely during a single flight.

The new brushes now are being applied in bombers and fighter planes on the company's 200-ampere, direct-current generators.

Binks Brings Out New Wartime Spray Gun

A new wartime spray gun is being made by Binks Mfg. Co., Chicago, to replace its aluminum models.

While not possessing the elaborate finish of former models, the new gun, known as the Thor No. 17, gives equal performance and is a thoroughly dependable substitute, the company states.

The gun is recommended as a general purpose unit, doing the work of its predecessors efficiently.

Develops "Victory" Points With Demountable Spindles

Abrasive wheels and points with demountable spindles is the latest development reported by Abrasive Co., Tacony and Fraley streets, Philadelphia. According to the manufacturer, the demountable spindle can be removed and used again and again on other points.

The mounted points, referred to as "victory" points, consist of a threaded porcelain bushing inserted in and fused to the abrasive wheel mass at the high heats of kiln temperatures during the vitrification process. The threaded bushing is part of the abrasive wheel mass. The demountable spindle simply screws into the porcelain bushing and forms a tight fit. In making a change, the spindle need not be removed from the grinder chuck or head.

The points are being offered in standard grain and grade combinations in vitrified bonded wheels or points.

WESTINGHOUSE WELDERS FOR JOB SHOP WORK

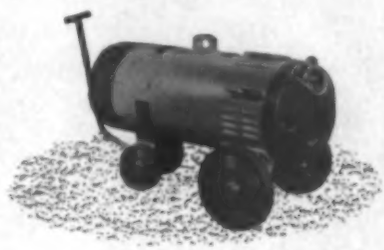
4 ways to better welding

FOR SHOP MAINTENANCE AND LIGHT WORK

Model WT-1C—100 amperes. Current range, 20 to 140 amperes. Built-in capacitor (optional). Built-in breaker protection. Easy to move.

ALL-PURPOSE WELDER

Model WT-4C—200 amperes. 27-step current adjustment from 20 to 250 amperes permits using wide variety of electrodes. Built-in capacitor (optional) and Nofuze "De-ion" Circuit Breaker.



NEW D-C WELDER WITH ARCONTROL

Single, pre-set current adjustment. Lots of capacity to handle all kinds of work. No drop-off after warming up. Simple adjustments. 200, 300 and 400-ampere models.

COMPLETE LINE OF WELDING ELECTRODES

Westinghouse electrodes are designed for fast production of high-quality welds with a-c or d-c on carbon steels, cast iron, stainless and alloy steels, sheet metal and special applications. Strike easily and have high deposition efficiency.

* * *

Write for latest a-c and d-c welding literature. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., Dept. 7-N. J-21279

Westinghouse

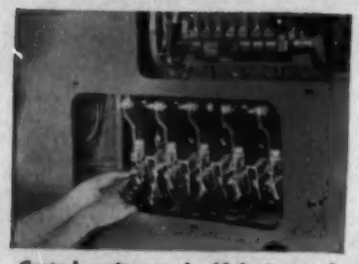
PLANTS IN 25 CITIES... OFFICES EVERYWHERE

WELDERS

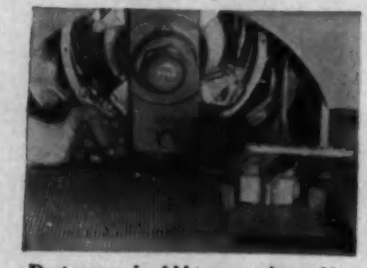
How to keep Your Trucks Running FOR THE DURATION

● Proper maintenance of industrial trucks always pays dividends, but today it becomes a deciding factor in the success of our war production effort. Most truck failures can be avoided by routine care and maintenance.

Correct lubrication according to manufacturer's instructions is an essential phase of truck care.



Control equipment should be inspected monthly. Here mechanic is replacing a finger tip.



Dust covers should be removed monthly to inspect commutators and brushes... Brushes should have at least 60% bearing surface.

Removing the rotor disc from the magnetic disc brake for monthly inspection.

First—Provide good floor conditions and DO NOT overload.

Second—Place trucks under the supervision of a competent mechanic.

Third—Lubricate regularly as instructed by manufacturer.

Fourth—Keep a record sheet covering weekly inspection findings, lubrications, adjustments, repairs. Thus excessive wear can be spotted and serious damage overcome.

ROUTINE SCHEDULE FOR TRUCK MAINTENANCE

Every Week. *BRAKES*—Test service brakes for stopping with maximum load, and parking brakes for holding on steepest incline. Adjust as required. Inspect linings—if dirty or greasy, wash in gasoline, if worn, replace.

STEERING CONNECTIONS—Test for:

a) Lost motion at ball joints and rod yokes due to wear.
b) Tight joints at rod yokes due to bent levers or rods.
c) Misalignment of steering wheels.
d) Worn bearings in steering post or bell crank.

Make adjustments according to instructions, and replacements as required. WHEEL ALIGNMENT—Follow manufacturer's instructions for checking and lining up wheels on each type of truck. LIFT OR HOIST—Clean grease and dirt from rails, inspect chains, anchor bolts, hydraulic system, and limit switch. Use neatsfoot oil to keep leathers soft. LUBRICATION—Follow manufacturer's instructions for points requiring weekly lubrication. ELECTRICAL EQUIPMENT—If working in dusty environment, remove covers from motors and electric controls, and blow out dust.

Every Month—Monthly inspection covers the most important mechanical parts of truck: power axle, wheel bearings and universal joints, spindle bearings, drive and torque yokes, Oldham coupling, trailing axle and wheels, brake drum, motors, brushes, controller, contactor, limit switches, hydraulic lift. Repairs on these parts are costly. Do not slight any part that requires lubrication. Keep moving parts free from dirt and grease. Follow detailed instructions from manufacturer.

Maintenance check list is available in bulletin form. Write for your copy or copies today.

BAKER INDUSTRIAL TRUCK DIVISION
of The Baker-Raulang Company
2167 WEST 25th STREET • CLEVELAND, OHIO
In Canada: Railway and Power Engineering Corp., Ltd.
2100-2A-48

Baker INDUSTRIAL TRUCKS

The Stanley Works

(*Concluded from Page* 122)

system for disposing scrap. Employes had been taught to keep this scrap clean, segregated and not allow accumulations.

The tonnage that we moved during the cleanup was all over and above the normal production of scrap, which runs to approximately 250 tons per week.

Besides giving us the benefit of space which some of this obsolete equipment and dormant scrap occupied, we have found that intensive salvage operations lead to real benefits in dollars and cents. In some cases the tools and dies which had been held for many years were useless. We further found that by laundering our wiping rags we reduced our purchases about 50 per cent. We save well over 10 per cent of the cost of workmen's gloves by having them laundered. We save cartons and lumber for use in boxes at a considerable annual saving.

Above all, we feel that The Stanley Works is very much more "on its toes." The foremen are looking for ways to save. Pieces of metal which are waste in one department are found suitable for production in another. The workers are cooperating fully, in many instances offering valuable suggestions for salvaging and conserving materials.

Such salvage achievement can be duplicated in hundreds of other plants throughout the country. This job must be done if our war production is to reach the volume necessary to insure the winning of the war.

National Oil Offers New Cutting Oils for Metals

New oils for use on practically all metals for cutting and machining operations are announced by National Oil Products Co., Harrison, N. J., following completion of exhaustive tests. According to George G. Stier, assistant manager of the company's Metal Working division, the series of oils are "definite improvements, not reproductions of existing products."

During development stage, extensive laboratory tests were conducted to yield most desirable cutting oil characteristics and the employment of raw materials which would be readily available rather than strategically scarce ingredients, it is said. In tests, materials were subjected to extended actual plant runs and then returned to the laboratory for further improvement.

Oils in this new group are known as Vegicut A and B, low and medium viscosity oils; Vegisol, an emulsifying cutting oil readily soluble in a wide range of waters; and Vegisulph, a sulphurized product providing maximum anti-welding protection.

Educating Women

(*Continued from Page 99*)

procedure, including interviewing, safety, handling of grievances, wage payment policy, labor agreement and related subjects.

Graduates of this course have gone into the different plants as chief supervisors and are developing assistant supervisors to meet the needs of each individual plant. This training is being done by up-grading girls doing all kinds of work.

At Stewart-Warner women make up 50 per cent of the working force and operate all types of machines, according to G. L. Thomas, superintendent.

For some time they have been operating hand screw machines sizes 3, 4 and 5, and recently three girls were put on size 6. They run the Cincinnati centerless grinder, multiple spindle drilling machines and gear hobbing machines.

All Lathes Run by Women

In some departments they have entirely taken over. They are in the majority in others. For instance, all lathes operated for production are manned by women, even bench lathes. They run all punch presses. They operate most of the milling machines. All drill presses up to size 3 are run by women and boys.

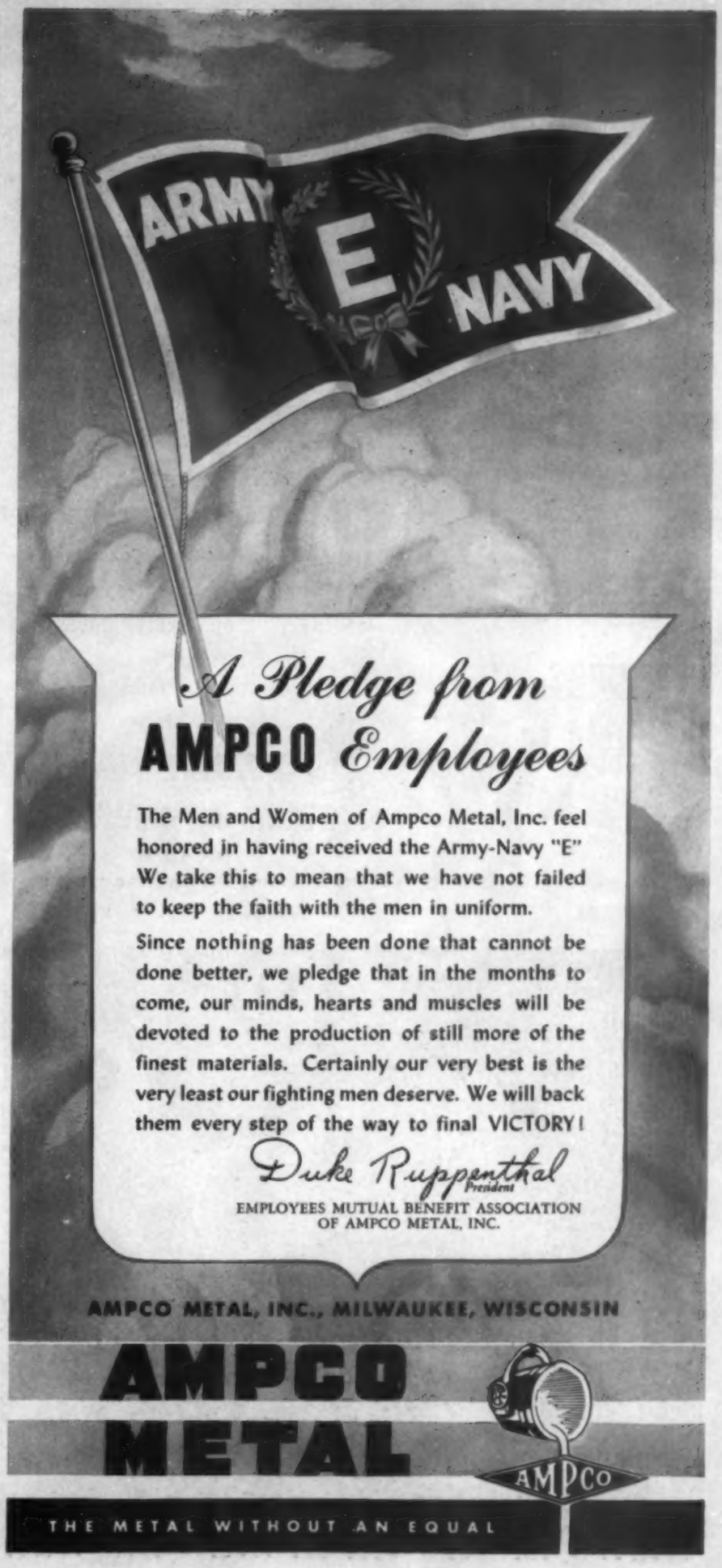
Women do most all types of assembly work, many assembly group captains are women. They are inspectors in every phase of machine parts production.

All women plant workers are trained in a two months' school operated by the company. Here they start on milling machines and drill presses, then they train on hand screw machines. Upon the completion of the course they can operate any machine a man can operate, says Mr. Thomas. On the average over 200 students are enrolled, and about 95 per cent are graduated. The school instructors are both men and women.

Stewart-Warner finds that absenteeism among women is somewhat higher than for men, with figures indicating 7 per cent for women against 3 per cent for men. These rates are based on 58 hours of work for men and 48 for women.

The overall present rate is 4.2 per cent. Seven months ago it was 14 to 15 per cent. This remarkable drop of 10 per cent is the result of a system which the company installed in October. In less than three months the rate had fallen to 6 per cent, and in another two months it was down to almost 4 per cent, where it has held with fractional variations. Now a new drive is being started to obtain a further lower rate.

This system uses the time clock as the indicator. Two posters were placed in


ARMY
E
NAVY
A Pledge from
AMPCO Employees
The Men and Women of Ampco Metal, Inc. feel honored in having received the Army-Navy "E" We take this to mean that we have not failed to keep the faith with the men in uniform.
Since nothing has been done that cannot be done better, we pledge that in the months to come, our minds, hearts and muscles will be devoted to the production of still more of the finest materials. Certainly our very best is the very least our fighting men deserve. We will back them every step of the way to final VICTORY!
Duke Ruppenthal
President
EMPLOYEES MUTUAL BENEFIT ASSOCIATION
OF AMPCO METAL, INC.
AMPCO METAL, INC., MILWAUKEE, WISCONSIN
AMPCO
METAL
AMPCO
THE METAL WITHOUT AN EQUAL

Our troops use *landing barges* which STANDARD forgings help to build

ARMY (E) NAVY

Whether for battleship or submarine, gun mount or tank, locomotive or industrial equipment, all Standard steel forgings and castings being used directly or indirectly in the war effort have a vital something in common. That something is the same high quality for which Standard products have been known in peace and war since the early beginnings of the company 148 years ago.

It is the kind of quality which Standard obtains by first producing acid open-hearth steel and then keeping every manufacturing process under rigid control right through to the finished forging.

STANDARD STEEL WORKS

DIVISION OF
THE BALDWIN LOCOMOTIVE WORKS
PHILADELPHIA

FORGINGS • CASTINGS • WELDLESS RINGS • STEEL WHEELS

a conspicuous place near every department time clock. Upon one is a picture of a plane, a tank, or ship, and "YOU ARE IMPORTANT. YOU ARE MAKING A PART OF THIS"—in large letters. The other poster shows how many employes were absent the day before.

All employes are requested to telephone the department when they are going to be late or absent. This request is made in the belief that many employes will report for work rather than telephone they are not coming in. To every employe who does not telephone or who cannot be reached by telephone, the company sends a telegram saying: "Closer to victory if you were here."

Asked to Explain

On return to work employes are asked why they were absent, and these reasons are written on their record cards. When an employe is absent two or three times the department head talks to him or her to learn if there is some difficulty the company can adjust. Sometimes the employe dislikes his job; in this case he is reclassified and given a job he likes. This ends this individual's voluntary absenteeism.

Layoffs are discouraged even when reasonable. Men going into the service are urged to work until the last day, on the argument that the more munitions they produce the quicker the war will be won. As a result many of them work up to the last hour.

The records show that the employes holding the more responsible jobs are absent the least, while those holding the least responsible jobs are absent the most. The absentee record of executives of every type, including foremen and supervisors, is 2 per cent on the average. Stewart-Warner believes that this system has helped to teach every employe his responsibility toward winning the war.

Issues Sixth Volume Of Chemical Formulary

Chemical Formulary, by H. Bennett, editor-in-chief; cloth, 636 pages, 5½ x 8½ inches; published by the Chemical Publishing Co. Inc., Brooklyn, N. Y., for $6.

This is a collection of commercial formulae and recipes for thousands of products in many fields of industry. This is the sixth of a series of formularies and contains additional material to broaden and bring to date the contents of the preceding volumes.

Special elementary formulae of direct and indirect military interest have been included. A chapter on substitutes for scarce materials is an innovation of interest and use to many. An enlarged directory of sources of chemicals and supplies has been added.

Instruments

(*Continued from Page* 101)

ture cannot be avoided, a protecting case should be used.

Do not expose instruments to strong magnetic fields.

When installing or relocating instruments, make sure all connections have been made exactly as specified in the instructions. All connections must be tight and free from dirt and moisture. Clean contacts and terminals often.

Charts for recording instruments should be stored in a cool dry place. Keep charts flat, preferably in their original package, until used. When recording instruments are out of service for any length of time, shut off power to the instrument and remove ink from the pens.

PRESSURE INSTRUMENTS frequently require special attention as their vital measuring elements usually are exposed to the material undergoing pressure treatment. This material usually fills the measuring system and may cause trouble unless the installation is properly made.

Protection of the Measuring Element: The material being processed may seriously corrode the element, may solidify in the measuring system at the ambient temperature, or it may deposit heavy tars to clog the measuring element. Protection from these conditions may be obtained by use of a diaphragm seal mounted below the gage, with the bourdon tube of the instrument and upper diaphragm housing filled with glycerin.

Fluid Pulsation Protection: Fluid pulsation is another cause of inaccuracies and short life of pressure instruments. A rapidly pulsating pressure will destroy the accuracy of the delicate sector-and-pinion movement by wearing the gage teeth and bearings. A shut-off valve placed ahead of the gage, and throttled until the pulsation disappears, will overcome this condition, but may result in clogging of this very small opening. Gage snubbers have been introduced to provide the same result. One type employs a large number of small passageways with changes in direction; in another the inertia of a moving piston prevents rapid pulsation, while a third type employs a rubber diaphragm with the gage tube filled with glycerin, the latter throttled by passing through a felt retainer.

Over-Range Protection: Be sure that the instrument has ample over-range protection to prevent blow-out at any pressure likely to be applied to the equipment or line. It is good practice to allow a margin of 100 per cent range than necessary to measure normal operation pressures for the equipment.

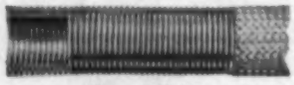
PYROMETERS AND THERMOCOUPLES: While the general informa-

REX-WELD
Helps Guard
HIS LIFE

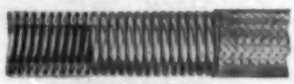
REX-WELD Flexible Metal Hose has met the critical test that demands only the best materials for our combat planes. More and more bombers, fighters and interceptor-pursuit ships are being Rex-Weld equipped.

REX-WELD's war service is not confined to the planes themselves. In the steel mills and munition factories, on the production and assembly lines, everywhere that war-worthy flexible connections are needed, REX-WELD is rendering vital service.

There are specific reasons for this. REX-WELD is a specially constructed flexible metal tubing. It is fabricated from strip metal by a precision autogenous welding process that produces uniform, stronger wall structure plus extreme flexibility. REX-WELD stands up under high pressures, high and low temperatures, extreme contraction and expansion. It is seep-proof to gas, water, oil, air and searching fluids.



Type RW-81
(annular corrugations)



Type RW-91
(helical corrugations)

Available in continuous lengths to 50 ft. Both Steel and Bronze. 3/16" I. D. to 4" I. D. inc. Pressures to 14,500 p.s.i. Temperatures to 1000° F.

Write for Engineering Recommendations

CHICAGO METAL HOSE CORPORATION

General Offices: MAYWOOD, ILLINOIS
Factories: Maywood and Elgin, Illinois

Good chain

—ready for hard work

Pass this word to your men—BEFORE HOOKING UP A CHAIN STRAIGHTEN IT OUT, CLEAR IT FOR ACTION. • Many new men don't know this should be done. • It's easy to handle chain the right way. Right handling results in better performance, longer life, and, above all, safety. • Treat chain right if you want to get the most work out of it, and reduce breakdowns, delays and accidents.

AMERICAN CHAIN DIVISION

York, Pa., Boston, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Portland

AMERICAN CHAIN & CABLE COMPANY, INC.
BRIDGEPORT, CONNECTICUT

tion on proper care given earlier applies to pyrometers as well as to other types of industrial instruments, the following suggestions apply particularly to pyrometric-type instruments:

To Localize Trouble: When a pyrometer fails to function properly, the trouble can be traced to the instrument itself, to the lead wire or to the thermocouple.

First, check connections between the thermocouple and lead wires, and between the lead wires and the instrument. Make sure connections are tight, and that the positive (+) terminal on the instrument is connected to the lead wire running to the positive side of the thermocouple connector head. Check the negative (—) lead wire in the same manner.

Second, move the thermocouple around slightly to determine whether the instrument reading is stable. If the reading is not stable, the thermocouple may be defective.

Several conditions may result in a defective thermocouple. Removal from the heat zone, and disassembly from its protecting tube may reveal one of its wires to be broken; wires to be pitted from corrosion, or wires to have fused due to excessive temperature.

If connections are tight and clean, and if inspection does not indicate the thermocouple to be defective, check the reading of the instrument in service with the reading of a portable potentiometer or a second pyrometer used for test purposes.

Test Instrument Check: First, put the test instrument thermocouple at the same point as that at which the service instrument thermocouple is installed.

Second, if the service instrument reads lower than the test instrument, connect the test instrument to the service instrument thermocouple to determine the millivoltage produced by the service thermocouple.

If the millivolt conversion table for the service thermocouple indicates its millivoltage is correct, the service instrument is defective and should be repaired. Should, however, the service thermocouple millivoltage be low, and the service instrument's millivoltage reading agree with the millivoltage actually produced as determined by the test instrument (with allowance made for lead wire resistance), the cause of the low millivoltage may be:

—A poor connection in the thermocouple or the thermocouple lead wire;

—Gases or vapors have caused contamination of the thermocouple, affecting its performance, or

—Thermocouple or lead wires partially shorted at some point away from the hot junction.

The thermocouple can be checked by

measuring the millivoltage at the connector head, rather than through the lead wires at the instrument. In this test, the lead wires must be connected from the connector head, and allowance made for the temperature of the thermocouple head itself. This temperature can be measured with a portable potentiometer or a test pyrometer.

If the millivoltage registered by connecting the test instrument (or the service instrument if it was found accurate by previous test) to the thermocouple connector head varies appreciably from the reading obtained earlier with the test instrument thermocouple, the thermocouple is at fault, with one or more of the three reasons given above as the cause. If there is no appreciable variance in the readings, there is a poor connection or a partial short in the lead wires between the connector head and the instrument.

After localizing the trouble in line with the above instructions, the defective part of the pyrometer hook-up—thermocouple, lead wires or instrument—can be readily replaced or repaired.

Thermocouple Repair: Damaged thermocouples can often be repaired so they can be used for their original application, or for some other application. Many thermocouples that have given way at the hot junction can be made usable by cutting off the damaged part and welding a new hot junction.

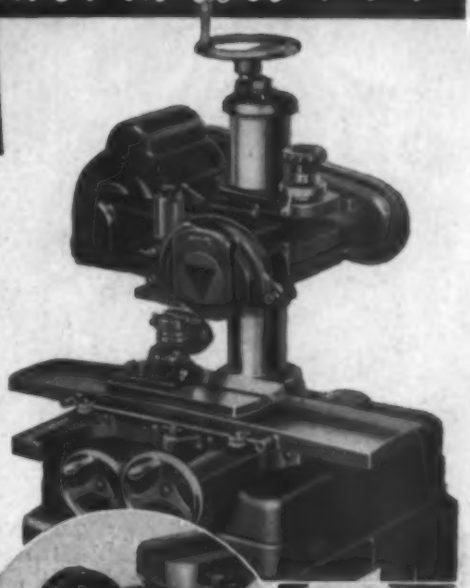
When repairing a thermocouple, or making a new one, cut both wires comprising the thermocouple to the same length. Prepare a good contact to the circuit by removing oxide from one end of each wire for a distance of about one inch, using a grinding wheel. Fasten the wires in a vise, or hold them securely in some other manner, and twist the unground ends together so that there are at least three turns of the wire.

Use an acetylene torch to weld the ends, selecting a torch tip in proportion to the size of the wire to be welded. For the smallest gage wires, use a No. 1 torch tip, and for the largest gages use a No. 10 tip. Fasten the torch in a vise so the flame will be horizontal. Adjust the torch so as to get a neutral flame about four inches long, with the white cone that surrounds the blue cone about ¾-inch long.

Hold the twisted junction of the wires in the flame at the tip of the white cone until both wires are a bright red; then dip in a fluxing mixture consisting of six parts of fluorspar to one of borax. If fluorspar is not available, borax alone may be used. Place the flux-covered twisted ends in the flame immediately. Since one wire melts at a lower temperature than the other, manipulate the weld in the flame until both wires reach their melting points at about the same time.

New Delta Chip-Breaker Grinder is simple, fast, dependable, accurate — and *much lower in cost . . .*

Gives all-around, long-time satisfaction in grinding the chip-breaker groove on carbide-tipped tools — used also for other production grinding.



In grinders costing many times as much, you do not find many of the new, exclusive features you get in this latest Delta machine. It's husky, solid (weight 700 pounds), over 6 feet high, an accurate machine designed to turn out a big volume of work. Yet its cost is amazingly low.

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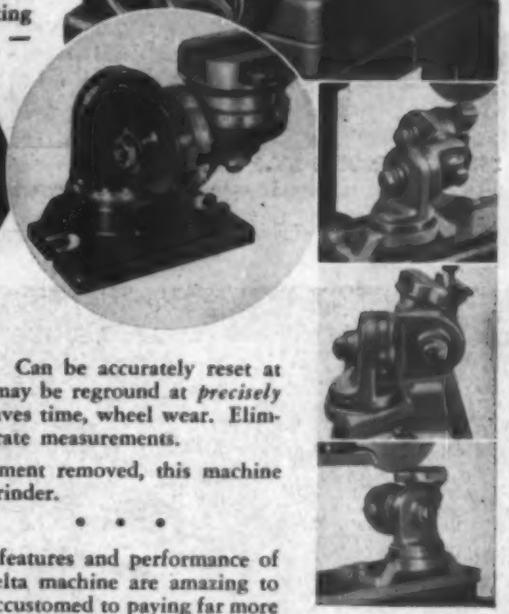

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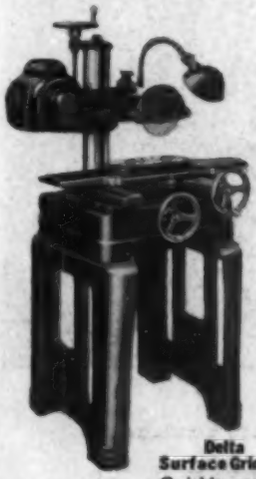

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This can be done by keeping the wire that melts first in the cooler part of the flame until the other wire is about to melt. As soon as both wires reach the melting point, revolve the weld in the flame until both ends flow together to form a ball weld at the tip. Use a moderately hot flame to avoid burning.

The weld should be made, if possible, at the first attempt. Continued heating and welding temperatures will result in a poor weld. If a good weld is not made promptly, and a shorter thermocouple can be used, cut off the ends, make a new twist, and repeat the procedure.

Protecting Tubes: No thermocouple will give maximum service unless it is properly protected. The protecting tube used is as important to the installation as the thermocouple. The tube should be carefully selected to meet all the conditions to which it will be subjected in protecting the thermocouple from injury.

Protective tubes must themselves be protected against conditions which might cause them to fail. The manufacturer's data on various types of tubes should be checked carefully. After the tube is installed, it should be inspected frequently and replaced before it can fail and permit injury to the thermocouple. Cast iron tubes used in aluminum or die cast metals should be painted with whiting daily.

When a load is being placed in a pot or furnace, care should be taken that the protecting tube is not damaged. Protecting tubes become soft at high temperatures, and any bending of the tube will break the porcelain insulators which surround the thermocouple itself. The thermocouple wires coming in contact with the protecting tube may become contaminated or damaged.

Porcelain protecting tubes will withstand shock and should be handled with great care. In those cases where porcelain protecting tubes are used in molten baths, the tube always must be removed before the bath is allowed to solidify. Never introduce a porcelain protecting tube into a heated furnace. Thermal shock may cause it to fracture. Put the tube in when the furnace is cold, and bring it up to temperature with the furnace.

Thermocouple Immersion: Three factors control the temperature of a thermocouple:

—Heat conduction and radiation to the couple from the hot medium. This factor, which should be as high as possible, is limited by the medium being measured and the protecting tube insulation.

—Heat conduction from the couple tip. The protection tube and the thermocouple both conduct heat from the tip.

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For the duration the Layne Organization is, in addition to doing much urgent war work, endeavoring to keep present installations in repair and operating at top efficiency. If you wish literature, address, Layne & Bowler, Inc., General Offices, Memphis 8, Tennessee.

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The thickness of the protecting tube should be small compared to its immersion in order to make this factor low.

—Heat content of the couple itself, determined by size of the wire. Lighter couples will have faster response, but correspondingly shorter life.

If a thermocouple is in a muffle, or atmosphere-control furnace, 30-inch immersion may be insufficient to obtain true readings, while 5-inch immersion may be sufficient in a molten salt bath. A method of testing is to "explore" the inside of the protection tube with the bare thermocouple. If, by pulling the couple out one inch, the temperature indication does not change, it may be assumed that the immersion is sufficient to obtain a true reading.

A correct temperature reading usually is not necessary. For control purposes, it is sufficient to have the couple in a position so that it will have a definite temperature relationship to the furnace. This relationship should be constant. The couple should be placed so that it will "sense" changes of input as rapidly as possible, and it should also be in a turbulent portion of the hot medium in order to decrease heat lag.

Thermocouples will give best service if kept clean. When thermocouples are used without protecting tubes, they should be cleaned daily. All thermocouples should be inspected frequently.

Making Tools Last

(*Continued from Page* 107)

be clearly seen that a systematic program of tool tipping is a *must* for the balance of the war.

Detailed information on particular problem may be obtained from the manufacturers of welding and brazing equipment and material. However, the following data and that in the fold-out chart will be found helpful in comparing procedures and equipment involved.

BRAZING: Low Temperature—This process is especially adapted to the requirements of high speed steel.

Apparatus: An oxyacetylene welding torch. A vise of jig in which to hold the tool in a convenient position.

Material: A silver brazing alloy shim of proper thickness, usually 0.003 to 0.008 inch, with a melting point of 1175 degrees Fahr. maximum. A flux of a type that will dissolve oxides found on high speed steel, and which will be fluid and active at brazing temperature. A good grease solvent.

Procedure for hardened high speed steels:

—In joining an inserted tip to a shank, machine or grind a recess in the shank to match the tip.

—Make sure that the surfaces of both recess and tip which are to be brazed

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are fairly smooth. A milled surface or equivalent is satisfactory.

—Clean all surfaces to be brazed with a good grease solvent.

—Place the shank in the vise of jig with the recessed end projecting.

—Coat the recess and the tip with flux.

—Place the shim of silver brazing alloy on the entire recessed surface to be brazed.

—Place the tip of the shim.

—Apply heat with the oxyacetylene torch. The flame should be neutral or slightly reducing.

—Direct the flame to the underside of the shank below the recess, moving the flame back and forth to distribute the heat evenly. Heat the shank until it becomes a barely visible dull red.

—Withdraw the flame to a greater distance from the work and continue heating until the brazing alloy melts, keeping the temperature as low as possible in order to avoid drawing the temper from the tip.

—Make sure the alignment of the tip is correct.

—Press the tip firmly into place. Maintain the pressure until the brazing alloy has solidified, as determined by eye, immerse the tool in oil long enough to set the braze, then cool in air. The hardness along the cutting edge should be comparable with that of solid hardened high-speed tools.

Procedure for butt joints, etc. In joining a tip to a shank when a notch is not used, such as in the case of a butt joint, the procedure is similar, except that additional care must be taken to make sure that the alignment is accurate.

BRAZING—High Temperature: This method is used for tipping with annealed high speed steel.

Apparatus: A high heat furnace of the types used for hardening solid high speed tools, or for brazing tungsten carbide bits; it is advantageous, although not necessary, to have the furnace of a type of which the heat can be localized on the end of the tool. Also, a preheating furnace is useful; but if not available the required preheat may be applied in the cooler portions of the high heat furnaces.

Material: For brazing with copper: Copper shims 0.003 to 0.005 inch in thickness. Brazing flux suitable for brazing with copper. A good grease solvent.

Material for brazing with ferro-alloy cement: Ferro-alloy cement. Copper sulphate. Sulphuric acid.

Procedure for brazing with copper:

—Machine or grind a recess in the shank to match the tip. Make sure that the surface of the tip which is to be brazed is fairly smooth. A milled or ground surface is satisfactory.

—Remove all grease and dirt with the

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solvent.

—Coat the tip and the recessed end of the shank with copper type brazing flux.

—Place the shank in the furnace, and heat until the flux flows freely. Maintain a neutral or slightly reducing atmosphere.

—Remove shank and fit the copper shim into the recess.

—Fit the tip onto the shim.

—Preheat the assembled tool to about 1600 degrees Fahr. in the preheating furnace or in the cooler portion of the high heat furnace.

—Transfer the tool to the high temperature furnace and hold it at the proper quenching temperature for the grade of high speed (2200 to 2350 degrees), until the tip has soaked out. Soaking time should be kept to a minimum to prevent grain growth.

—Since the melting point of copper is 1980 degrees Fahr. the copper shim will have melted and spread over the interfaces. Withdraw the tool.

—Adjust the alignment.

—Press the tip firmly into place to squeeze out the excess copper and flux.

—As soon as the copper has solidified, quench the tipped end in oil until the temperature has dropped to below 200 degrees Fahr.

—Temper the tool at 1000 to 1060 degrees Fahr.

Procedure with ferro-alloy cement:

—Prepare a flat surfaced recess for tip. The surfaces to be joined should be fairly smooth. Milled finish or equivalent is satisfactory.

—Clean surfaces with the grease solvent.

—Prepare a solution of 3 ounces of copper sulphate and 10 drops of concentrated sulphuric acid, dissolved in one pint of water. With this solution paint the surfaces to be joined.

—While the surfaces of the recess are still moist sprinkle over them a layer of commercial ferro-alloy. Smooth out the layer so that it is flat and about 1/32-inch thick.

—Press the tip firmly into the recess.

—Set the tool aside for an hour or more. This will affix the tip securely enough to permit handling.

—Preheat the tool to about 1600 degrees Fahr. in the preheating furnace or in the cooler portion of the high heat furnace.

—Transfer the tool to the high temperature furnace and raise it to a quenching temperature proper for the grade of high speed involved (2200 to 2350 degrees Fahr.).

—Soak out the tip, but keep the soaking time to a minimum.

—Withdraw the tool and press the tip into the recess to squeeze out excess cement, using foot treadle, or tongs.

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—Check the alignment.

—When the cement has solidified quench the tool in oil or air until the temperature has dropped to below 200 degrees Fahr.

—Temper the tool at 1000 to 1050 degrees Fahr.

WELDING—Resistance Flash Weld: This method is particularly adapted to butt welding a high speed tip to a single steel shank, but may also be used for welding a tip to the face of a simple steel shank adjacent to the end, although considerable care is required in this procedure.

It is desirable, for butt welds, that the areas of the sections of the two parts to be welded be as nearly equal as possible in order to avoid disproportionate rates of heating. A difference of 10 per cent is the maximum that should exist in applications of this method.

Apparatus: A tempering furnace. A standard resistance flash welder, manually operated by motor or hydraulically driven, and equipped with changeable copper dies machined to fit the contours of the sections to be gripped during welding.

Procedure for welding hardened high speed steel:

—Preheat the parts to be sealed to about 1000 degrees Fahr.

—Clamp the tip or stub on one pair of welding dies, and the shank in the other pair.

—Make sure the alignment is correct.

—Weld. The duration of the flash, the pressure, and the amount of upset required for an efficient resistance flash weld are details which can be learned only through experience.

—Immediately at the conclusion of the weld, place the tool in the furnace at a temperature of 1000 to 1050 degrees Fahr. and maintain this temperature for about two hours. This will relieve thermal stresses at the welded section. The tool should not be permitted to cool in air from the welding heat.

—At the end of the tempering period, remove the tool from the furnace and cool in air.

—Remove the flash and dress the upset.

—Form the cutting edge.

Procedure for welding annealed high-speed blanks to simple steel shanks, not for subsequent forging:

—Same as above to point where weld is completed.

—At the conclusion of the weld, bury the tool in lime, mica, ashes, or other inert material until cool, to prevent excessive thermal shock.

—Anneal the tool according to high speed steel practice.

—Remove the flash and dress the upset.

—Form the cutting edges.

—Harden and temper according to high speed practices.

Procedure for welding annealed high speed blanks to simple steel shanks for subsequent forging:

—Same as above to point to where weld is completed.

—From the welding temperature, cool the tool in lime, ashes, or other inert material.

—Anneal the tool according to high speed steel practice.

—Forge. Then cool in lime, ashes, etc.

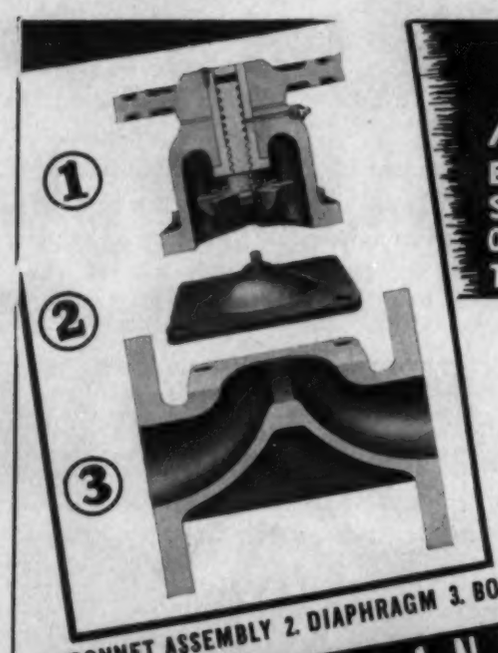
—Anneal according to high speed practice.

—Form the cutting edges.

—Harden and temper according to high speed practices.

WELDING — Pressure Weld: This method is suitable for joining high speed stubs to simple steel shanks. The minimum size that can be welded economically is about ½-inch. There is no maximum size limitation except that established by the capacity of the apparatus.

Apparatus: A manual, mechanical, or hydraulic pressure machine capable of applying pressure of 4000 to 4500 pounds per square inch. A pressure gage ca-



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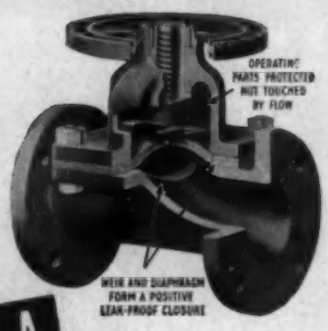

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pable of measuring twice this pressure. Alignment holding jigs. Heating apparatus, variable with size and shape of cross section to be welded, and providing for oscillation of the flame through a short distance above and below the weld section. An auxiliary furnace capable of attaining a temperature of about 1650 degrees Fahr. for slow cooling the welded piece.

Procedure: Smooth out the sections to be welded. A smooth machine finish or equivalent is satisfactory. The cut must be perpendicular to the longitudinal axis of the pieces. Abrasive cut off wheels should be checked for accuracy.

—Secure the high speed stub and simple steel shank end to end in the welding apparatus.

—Apply an initial and pressure of about 1000 pounds per square inch of joint cross section.

—Ignite the gas in the heating head. Adjust the flame to a neutral or slightly reducing ration.

—Oscillate the heating head across the weld interface through a distance of about one-third the weld face diameter in either direction from the weld face, allowing a slightly longer play of flame on the high speed side. The pressure will now rise rapidly, due to thermal expansion of the heated sections. Then as the metal in this weld becomes heated into the plastic range the pressure gradually falls off. This will be at a temperature of 2300 to 2500 degrees Fahr.

—When the welding pressure has dropped to a predetermined value of between 3000 and 4000 pounds per square inch, maintain this pressure, either manually or automatically. Upsetting will now take place.

—When a predetermined optimum weld upset has been reached, release the pressure, and remove the piece.

—Immediately transfer the piece to the annealing furnace at about 1650 degrees Fahr.

—Cool the piece to room temperature at the rate of 100 degrees Fahr. an hour or slower. If this coding cycle is followed, a hardness of 325 brinell or less will result.

—Remove the excess weld metal.

—Machine the cutting edges.

—Treat the tool according to standard high-speed practice for the grade.

MECHANICAL TOOL HOLDERS: These are well adapted to the requirements of high speed steel. Tool holders are designed to hold cutters for lathe and planer tools, and consist of a simple steel shank with a recess through one end, into which a cutter is inserted. The cutter is held in place by a set screw. Thus, a relatively small inserted cutter replaces the high speed steel content of a solid tool.

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Industrial Truckers

(*Concluded from Page* 114)

Remember, the one you are operating will have to go right ahead doing its present job throughout the war and into the peace. So—

—Drive carefully all the time—other people too must earn their living. Move right along but keep the truck under control. Make turns cautiously—somebody else may be just around the corner and coming toward you.

—Go easy when approaching elevator gates, or traveling near pits, or across bridges or down inclines, or through tunnels, or across railroad tracks. When crossing tracks, keep a firm grip on the steering wheel or lever, and cross diagonally instead of at right angles.

—When entering an elevator, stop at a safe distance, walk to the gate, press the signal button. Drive onto the elevator, platform first. Be careful your load does not exceed elevator capacity.

—Proceed cautiously. Don't drive too close to other trucks or pedestrians.

—Be extra careful while approaching and passing noisy machines. Use the horn only when you must, but be sure your signals are heard.

—Keep load in front of you. Your operating position should always be at the rear of the load. Keep your load down to a clear view ahead. When traveling in reverse, face or partially face in that direction and drive cautiously.

—Get under loads squarely with both forks or with the end of the platform. Using only one fork or a corner of the platform can twist, strain and permanently damage the whole truck.

—Use brakes when needed, but don't jam them on. It's bad for the truck; it may spill the load—worst of all, it can spill and injure YOU.

—Don't cut corners. You are in danger of having to stop quickly—lose the load—hurt someone or damage the goods. Or, you may strike a post or machine with either the load or the truck, injuring one or both.

—Don't slam the truck into projections such as building columns or roof supports—boxes or piles of materials—over obstructions on the floor—bits of sharp metal or broken glass under the wheels. You can damage the truck, rip hunks out of irreplaceable tires, endanger your own and others' safety.

—Learn to "listen" with your finger tips. Just as in driving a car, you can quickly learn many important things about your truck by sounds that come as easily to your hands as they do to your ears. Report any unusual noises to your superior.

—Be a good housekeeper. Keep the truck swept, brushed and wiped clean. Report immediately any need for repairs.

—Don't let anybody joyride on your truck platform.

—Don't allow others to operate your truck. They may injure someone, or damage the truck so you will have to wait until it is repaired. It takes time to get spare parts these days.

Issues Handbook on Use of Gage Blocks

A 64-page *Handbook of Precision Measurement* is being offered by Jansson Gage Co., Detroit, to help train inspectors and machinists in the use of gage blocks and vernier instruments.

Instruction section of the publication is in five chapters devoted to the history making gage block combinations, gage of measurement, precision measurement, block inspection, angle measurement with the sine bar and the use and reading of vernier calipers and height gages.

Photographs of actual operations supplement the text which is in nontechnical language. Copies of the handbook are being offered for 50 cents each.

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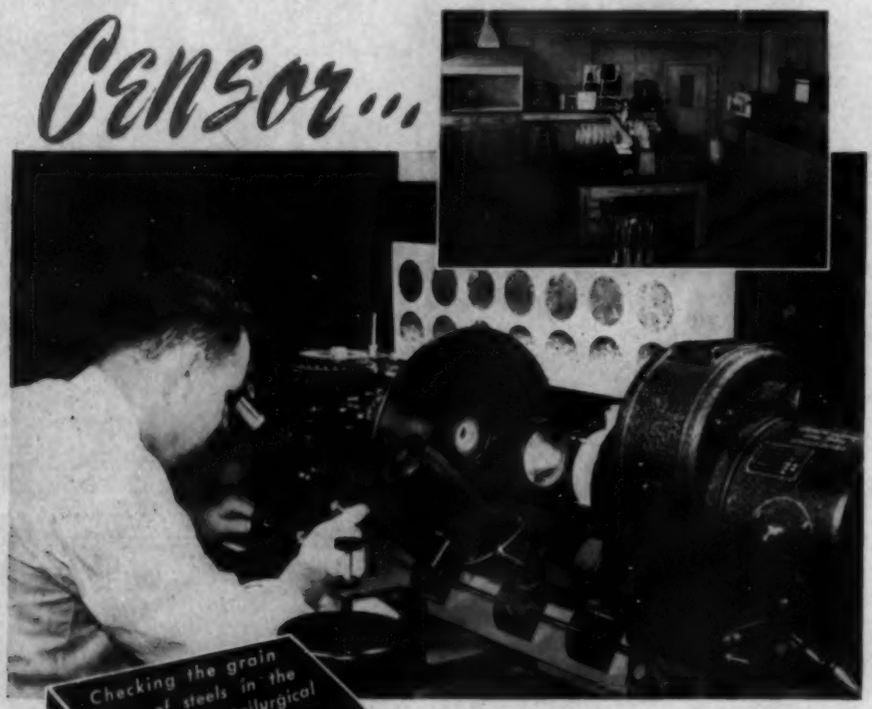

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FROM start to finish Fairfield gears are subjected to exhaustive tests and examination. They are made on the finest equipment available, heat treated under extremely close control, painstakingly inspected, tested on gear laboratory equipment and built to meet the highest standards.

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FAIRFIELD MANUFACTURING COMPANY
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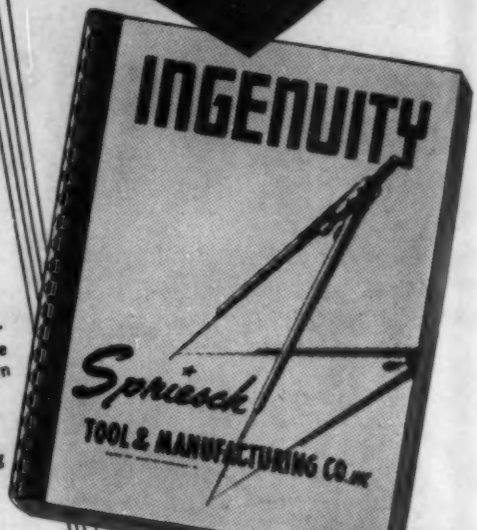

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Mar. 8, 1943

Spriesch Tool & Manufacturing Co., Inc.
Buffalo, N. Y.

Gentlemen: Your attention-compelling advertisement in a recent issue of Printers' Ink prompted us to request your brochure "Ingenuity." Several days ago we received information indicating your interest in preparing contracts for your organization after the war.

Our corporation, comprising four manufacturing divisions, are engaged in light industrial work. Specialty machinery is used but there is room for substantial improvement on the machinery we now operate with and we are not properly mechanized throughout the business. There is much hand work done which should be eliminated. The war has brought this forcibly to our attention

Are you interested in the development of new machines for our company! If so, tell us how we should proceed to place our problems before you for study now, with the idea of producing these machines as soon as the war is over.

Very truly yours,
HOPPER PAPER CO., INC.
By: Robert Hopper

This letter reproduced by permission, will give you an idea of one company's postwar planning

• • • We've been serving the Army since 1928; went on our present 24 hour production schedule long before Pearl Harbor.

Write (on your business letterhead, please) for our informative 36-page brochure "Ingenuity." In it is illustrated and described our extensive facilities and our spirit... and both could serve you well After Victory. Joseph J. Cheney, President.

Spriesch TOOL & MANUFACTURING CO., Inc.

Established 1923

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Ad No. 28

Surface Finishing

(*Concluded from Page* 104)

they might be expected to in relation to the hardness of the steel, he observed that the explanation is that the part is prestressed with compression in the surface. Nitriding produces a similar effect, bringing compressive stresses up to 175,000 pounds per square inch in the surface and leaving the core unaffected. Heat treated glass is an example of the same phenomenon in a non-metallic material.

The use of test strips of steel fastened to heavy base blocks and shotblasted along with production parts to provide a measure of the depth and extent of compressive stresses by relating them to the curvature of the test strips when released was suggested as a possible uniform system for all companies using the process to gage the intensity of the blasting treatment.

It is possible to overdo shotblasting and thereby cause early failure of a part, for when the surface of a part is stressed in compression the interior will be stressed in tension and the latter stress may become too high if the shotblasting is carried on too long for the section involved. This calls for some specification of the intensity of shotblasting for various sections and hardnesses of metal.

The question has been raised about how to select the size and shape of shot for the process. Mr. Almen suggests that at present it is necessary to rely principally on test experience as a guide. "Dusting" of the surface by shotblasting does no appreciable good while, as just explained, excessive shotblasting is harmful. On engine connecting rods it has been found that an arc height on standard test strips of 0.012 to 0.014-inch indicates satisfactory treatment. Standard test strips are available from American Foundry Equipment Co.

The shotblast treatment is not being confined to steel parts alone, as experiments are now well along on treating both magnesium and aluminum parts. Some change in the type of shot used is indicated, one idea being to use annealed chilled iron shot quite large in diameter to avoid imbedding in the softer metals.

There are two sources of shotblasting equipment for surface finishing parts to improve fatigue life. In addition to the American Foundry Equipment Co., Mishawaka, Ind., already mentioned, the Pangborn Corp., Hagerstown, Md., is cooperating in the development of special equipment and production methods.

A related surface finishing method, which has found limited application to steel, magnesium and aluminum parts is Roto-finishing or wet tumbling in an abrasive sludge. Originally developed at a small arms plant for removing burrs and producing form-controlled radii of 0.010-inch, it is now being used by several other companies, including Packard, to eliminate manual polishing and reduce costs and manpower.

Packard has used the method experimentally in a camshaft where a 0.010-inch radius is required on all edges. Machined and ground shafts are placed on rocks in a tumbling barrel and tumbled for 3 hours. As applied in production, 20 shafts are tumbled at a time. The resulting surface has a grayish appearance on which profilometer testing shows an improvement over the original surface. Polishing with a cloth wheel changes the surface to resemble plating. Material used in the tumbling barrel is a mixture of sand, sawdust, pebbles and a saponifying material.

The process does not appreciably improve the fatigue life or affect the physical characteristics, since it merely burrs and polishes. Dimensional changes likewise are negligible, a piston pin checked after Roto-finishing showing a change of only 0.00005-inch in diameter.

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NON-FLUID OIL safeguards bearing life by lubricating dependably. It protects bearings from pitting and corrosion, so guarantees long life and trouble-free operation. Recommendation by leading makers of ball and roller bearings proves it superior to grease.

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NOW you can get your own special shapes as well as the usual standard sizes in Victory Tool Shanks. Just send us a sketch of the shank, showing shape and size, for a quotation. The cost of even the most unusual, difficult shapes is surprisingly low.

Chief advantages of Victory Tool Shanks of tough Meehanite, cast to any desired shape, are these:

1. They eliminate the need for critical steels.
2. They are immediately available in quantity.
3. They require a minimum of machining before use.
4. Carbide cutting tips are easily affixed in any shop equipped to tip its tools.
5. Meehanite does not load the grinding wheel as rapidly as steel.
6. Meehanite has double the vibration damping capacity of steel.
7. Meehanite has a coefficient of expansion closer to carbide than has steel.

WHEN YOU WRITE, ask for Bulletin No. 53 T-2 which shows standard sizes and prices. Pick out a size you can use and ask for free samples. We invite you to judge Victory Tool Shanks by their performance in your own shop.

THE COOPER-BESSEMER CORPORATION
DEPT. K, MOUNT VERNON, OHIO

Cooper-Bessemer

Little Difficulty Met In Passing Under CMP

Full order books indicate general understanding of plan. . .
Coal strike effect to be felt later in finished steel output. . .
Pig iron and ingots affected first

DEMAND
Still exceeds capacity.

PRODUCTION
Down 6½ points to 92 per cent.

PRICES
Ferroalloys being adjusted.

TRANSITION of steel distribution control from Production Requirements Plan to Controlled Materials Plan is now complete, as of July 1, and while some difficulties are being met in application of the new method, most steel users have followed instructions and are well covered.

Observers believe that once the trade becomes thoroughly familiar with CMP procedure less confusion will result. Some buyers failed to recognize that they no longer are being supplied on a month-to-month basis and have come into the market to find mills fully booked for the period in which they had expected to get on rolling schedules. That most users have placed orders promptly and much further ahead than permitted under the former system is reflected by the fact that third quarter capacity generally is booked full. Some producers are sold through October and also have some orders extending into next year.

Impact of the coal stoppage is felt mainly in output of pig iron as blast furnaces are banked because of lack of coke and effect on finished steel production will come later, as supply of ingots and semifinished steel is depleted.

• • •

Plate orders continue heavy and some producers are booked through October, with some requirements not yet filled, indicating that full production through the year may be completely covered within a short time. Efforts of War Production Board to obtain larger steel output during the remainder of the year are caused in large part by need for more plate tonnage, for shipbuilding and other war purposes.

Steel production last week fell 6½ points to 92 per cent of capacity as a result of the coal stoppage, the lowest rate since the first week of July, 1941. The largest factor in this drop was the Pittsburgh district, which declined 21½ points to 76½ per cent of capacity, entirely attributed to lack of coal for coke. Other declines were small: Cleveland, 4 points to 90 per cent; Youngstown, 3 points to 94; Cincinnati, 3 points to 92; New England, 2 points to 93; Birmingham, 5 points to 95 and Wheeling ½-point to 86. Chicago advanced ½-point to 98½ per cent and Buffalo 2½ points to 93. St. Louis was unchanged at 95 per cent, eastern Pennsylvania, 93, and Detroit 92 per cent.

Sheet deliveries are tightening, despite numerous cancellations, though the latter apparently have ceased. Recently a considerable tonnage of galvanized sheets was taken off mill books because of a change from lifeboats to life rafts. In spite of this, galvanized sheets are increasingly difficult to obtain for third quarter delivery. Some sheetmakers are receiving inquiries from regular customers for postwar delivery. These are not being booked and are regarded simply as feelers to discover what is being planned in the way of special products after the war ends. On the other hand sellers are interested in discovering what their clients have in mind for that period, when more normal consumption starts.

Narrow hot-rolled strip deliveries are being maintained close to schedule in alloy and carbon grades, to rerollers and cold finishers. Annealing equipment is a choke point in many instances. Little capacity is open in fourth quarter for cold-rolled strip and some sellers are filled to the year end.

• • •

Wire products are assuming a more important role in the war effort and producers of heavy tonnage lines are booked to the end of the year in most cases. Specialties requiring long processing are in much the same position. Few mills have fourth quarter capacity for these products and an increasing number of orders is appearing for next year. Wire mills booked more tonnage in June than was shipped and in some cases it was double shipments.

Shipbuilding requirements for cold-drawn bars are increasing in some districts and are pressing aircraft needs, which have held first place for some time. In both cases demand is increasing but ship work is gaining faster. These developments are more than making up for smaller consumption by the machine tool industry. Most cold drawers can offer little material before November. Manpower is becoming a deterrent as workers go to better paying employment. Hot-rolled carbon bars can be booked for October delivery but in large sizes little can be obtained before November.

Composite market averages for steel and iron products are maintained at established levels, Office of Price Administration ceilings governing. Finished steel composite is $56.73, semifinished steel $36, steelmaking pig iron $23.05 and steelmaking scrap $19.17.

COMPOSITE MARKET AVERAGES

	July 3	June 26	June 19	One Month Ago June 1943	Three Months Ago April, 1943	One Year Ago July, 1942	Five Year Ago July, 1938
Finished Steel	$56.73	$56.73	$56.73	$56.73	$56.73	$56.73	$58.00
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	36.60
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	23.05	19.05
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	13.30

Finished Steel Composite:—Average of industry-wide prices on sheets, strip, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material	July 3, 1943	June, 1943	April, 1943	July, 1942
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.49	2.49	2.49
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.22	2.22	2.22
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pittsburgh	2.60	2.60	2.60	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55
Semifinished Material				
Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods, No. 5 to ⅜-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron	July 3, 1943	June, 1943	April, 1943	July, 1942
Bessemer, del. Pittsburgh	$25.19	$25.19	$25.19	$25.19
Basic, Valley	23.50	23.50	23.50	23.50
Basic, eastern, del. Philadelphia	25.34	25.39	25.39	25.39
No. 2 fdry., del. Pitts., N.&S. Sides	24.69	24.69	24.69	24.69
No. 2 foundry, Chicago	24.00	24.00	24.00	24.00
Southern No. 2, Birmingham	20.38	20.38	20.38	20.38
Southern No. 2, del. Cincinnati	24.30	24.30	24.30	24.06
No. 2 fdry., del. Phila.	25.84	25.89	25.89	25.89
Malleable, Valley	24.00	24.00	24.00	24.00
Malleable, Chicago	24.00	24.00	24.00	24.00
Lake Sup., charcoal, del. Chicago	31.34	31.54	31.54	31.54
Gray forge, del. Pittsburgh	24.19	24.19	24.19	24.19
Ferromanganese, del. Pittsburgh	140.33	140.65	140.65	140.65
Scrap				
Heavy melting steel, Pittsburgh	$20.00	$20.00	$20.00	$20.00
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.75	18.75
Heavy melting, steel, Chicago	18.75	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00
Coke				
Connellsville, furnace, ovens	$6.50	$6.50	$6.40	$6.00
Connellsville, foundry, ovens	7.75	7.75	7.50	7.25
Chicago, by-product fdry., del.	12.25	12.25	12.25	12.25

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. All seconds and off-grade products also are covered. Exceptions applying to individual companies are noted in the table. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.

(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill.)

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncropped, $45.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34.00; Detroit, del. $36; Duluth (bil.) $36.

(Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co. $41, Sterling, Ill.; Laclede Steel Co. $34, Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives.)

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40. Detroit, del. $42; Duluth, $42.

(Andrews Steel Co. may quote carbon forging billets $50 gross ton and Follansbee Steel Corp. $49.50 at established basing points.)

Open Hearth Shell Steel: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section: 3-12 in., $52; 12-18 in., excl., $54.00; 18 in. and over, $56. Add $1.75 del. Detroit; $2.75 del. Eastern Mich.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54; del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Pt., Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, Galveston, No. 5—9/32 in., inclusive, per 100 lbs., $2. Do., over 9/32—47/64-in., incl., $2.15.

Worcester add $0.10; Pacific Ports $0.50.

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3": Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Mahoning Valley 2.22½c; Detroit, del. 2.25c; Eastern Mich. 2.30c; New York del. 2.49c; Phila. del. 2.47c; Gulf Ports, dock 2.52c; Pac. ports, dock 2.80c. (Phoenix Iron Co., Phoenixville, Pa., may quote 2.35c and Eckels Mfg. Co. 2.40c at established basing points. Joslyn Mfg. Co. may quote 2.35c, Chicago base. Calumet Steel Division, Borg Warner Corp., may quote 2.35c, Chicago base, on bars produced in its 8-inch mill.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.

(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del., 2.82c.

(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.55
		(.20-.30 Mo)	0.60
2300	1.70	4340	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.70	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70c; Toledo 2.80c. (Keystone Drawn Steel Co. may sell outside its usual market area on Proc. Div., Treasury Dept. contracts at 2.65c, Spring City, Pa., plus freight on hot-rolled bars from Pittsburgh to Spring City. New England Drawn Steel Co. may sell outside New England on WPB directives at 2.65c, Mansfield, Mass., plus freight on hot-rolled bars from Buffalo to Mansfield.)

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.45c; Eastern Mich 3.50c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c; Pacific ports, dock 2.55c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown base 2.15c; Detroit, del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c; Pacific ports, dock 2.80c.

(Sweet's Steel Co., Williamsport, Pa., may quote rail steel reinforcing bars 2.33c, f.o.b. mill.)

Iron Bars: Single refined, Pitts. 4.40c, double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, common, 2.15c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.10c; Granite City, base 2.20c; Detroit del. 2.20c; Eastern Mich. 2.25c; Phila. del. 2.27c; New York del., 2.34c; Pacific ports 2.65c.

(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O. base.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.15c; Eastern Mich. 3.20c; New York del. 3.39c; Phila. del. 3.37c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c; Granite City, base 3.60c; New York del. 3.74c; Phila. del. 3.67c; Pacific ports 4.05c.

(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; Granite City 3.70c; Pacific Ports 4.25c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh 4.25c.

Enameling Sheets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 10 gage, base 2.75c; Granite City, base 2.85c; Detroit del. 2.85c; Eastern Mich. 2.90c; Pacific ports 3.40c.
Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 20 gage, base 3.35c; Granite City, base 3.45c; Detroit del. 3.45c; Eastern Mich. 3.50c; Pacific ports 4.00c.

Electrical Sheets, No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	....
65	7.15c	7.90c	....
58	7.65c	8.40c	....
52	8.45c	9.20c	....
U.S.S., R.C. Grade 10.10	....	....	....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less 2.10c;.. Detroit del. 2.20c; Eastern Mich. 2.25c; Pacific ports 2.75c. (Joslyn Mfg.
Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Eastern Mich. 2.95c; Worcester base 3.00c.
Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Chicago 3.05c; Detroit del. 3.45c; Eastern Mich. 3.50c; Worcester base 3.35c.
Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.
Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box, 0.50 lb. tin, $4.50; 0.75 lb. tin $4.65.
Tin Mill Black Plate, Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.
Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c; Pacific ports 4.55c.
Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.
Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C., 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16.00; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.10c; New York, del., 2.29c; Phila., del., 2.15c; St. Louis, 2.34c; Boston, del., 2.42-67c; Pacific ports, 2.65c; Gulf Ports, 2.45c.
(Granite City Steel Co. may quote carbon plates 2.35c, f.o.b. mill. Central Iron & Steel Co. 2.20c, f.o.b. basing points.)
Floor Plates: Pittsburgh, Chicago, 3.35c; Gulf ports, 3.72c; Pacific ports, 4.00c.
Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4.15c.
Wrought Iron Plates: Pittsburgh, 3.80c

Shapes

Structural shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del., 2.27c; Phila., del., 2.215c; Gulf ports, 2.47c; Pacific ports, 2.75c.
(Phoenix Iron Co., Phoenixville, Pa. may quote carbon steel shapes at 2.30c at established basing points and 2.50c, Phoenixville, for export.)
Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester, $1 for Duluth):

Bright basic, bessemer wire	2.60c
Galvanized wire	2.60c
Spring wire	3.20c

Wire Products to the Trade:

Standard and Cement-coated wire nails, and staples, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, Duluth $2.55; Pacific ports	3.05c
Annealed fence wire, 100-lb., Pittsburgh, Chicago, Cleveland	3.05c
Galvanized fence wire, 100 lb., Pittsburgh, Chicago, Cleveland	3.40c
Woven fence, 15½ gage and heavier, per base column	.67
Barbed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 70; twisted barbless wire, column 70; single loop bale ties, column 59; fence posts, carloads, column 69.	

Pipe, Tubes

Welded Pipe: Base price in carloads, threaded and coupled, to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld					
	Steel			Iron	
In.	Blk.	Galv.	In.	Blk.	Galv.
⅛	56	33	⅛	24	3½
¼ & ⅜	59	40½	¼	30	10
½	63½	51	⅜-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld					
	Steel			Iron	
In.	Blk.	Galv.	In.	Blk.	Galv.
2	61	49½	1¼	25	3½
2½-3	64	52½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-19	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet, f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

		—Seamless—		—Lap Weld—	
O. D. Sizes	B.W.G.	Hot Rolled	Cold Drawn	Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	....	....
1¼"	13	9.26	10.67	....	....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $40.00.
Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $40.00.
*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $28-$30.
Supplies: Angle bars, 2.70c; track spikes, 3.00c; track bolts, 4.75c; do. heat treated, 5.00c. Tie plates, $43 gross ton, base.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.: Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.
High Speed Tool Steels:

Tung.	Chr.	Van.	Moly.	Pitts. base. per lb.
18.00	4	1	...	67.00c
1.5	4	1	8.5	54.00c
	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	....	....
*316	40.00	44.00	48.00	40.00	48.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
440A	24.00	28.50	33.50	23.75	36.50
442	22.50	25.50	32.50	24.00	32.00
443	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304	....	‡‡18.00	19.00	....	....

*With 2-3% moly. †With titanium. ‡With columbium. ** Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extras mean additions or deductions from base prices in effect April 16, 1941.
Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price, plus all-rail freight may be charged.
Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price. **Emergency basing point** is the basing point at or near the place of production or origin.
Seconds, maximum prices: flat-rolled rejects 75% of prime prices; wasters 75%, waste-wasters 65%, except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.
Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

⅛ x 6 and smaller	65½ off
Do., ¼ and ⅜ x 6-in. and shorter	63½ off
Do., ½ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	56 off
Plow bolts	65 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

Semifinished hex.	U.S.S.	S.A.E.
⅞-inch and less	62	64
1-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	..

Hexagon Cap Screws

Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	71 off
Headless, ¼-in., larger	60 off
No. 10, smaller	70 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural	3.75c
⅞-inch and under	65-5 off
Wrought washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.	$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*6.50
Connellsville, foundry	7.50- 8.00
Connellsville prem. fdry.	7.75- 8.10
New River, foundry	8.50- 8.75
Wise county, foundry	7.25- 7.75
Wise county, furnace	6.75- 7.25

By-Product Foundry

Kearny, N. J., ovens	12.15
Chicago, outside delivered	11.50
Chicago, delivered	12.25
Terre Haute, delivered	12.00
Milwaukee, ovens	12.25
New England, delivered	13.75
St. Louis, delivered	†12.25
Birmingham, ovens	8.50
Indianapolis, delivered	12.00
Cincinnati, delivered	11.75
Cleveland, delivered	12.30
Buffalo, delivered	12.50
Detroit, delivered	12.25
Philadelphia, delivered	12.38

*Operators of hand-drawn ovens using trucked coal may charge $7.00, effective Feb. 3, 1943. †$12.75 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do., less than car lots	13.25c
Do. tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls., to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$29.20

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941. Exceptions indicated in footnotes. Allocation regulations from WPB Order M-17, expiring Dec. 31, 1942. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	No. 2 Foundry	Basic*	Bessemer	Malleable
Bethlehem, Pa., base	$25.00	$24.50	$26.00	$25.50
Newark, N. J., del.	26.53	26.03	27.53	27.03
Brooklyn, N. Y., del.	27.50	.....	.....	28.00
Birdsboro, Pa., base	25.00	24.50	26.00	25.50
Birmingham, base	‡20.38	†19.00	.....	.....
Baltimore, del.	25.61	.....	.....	.....
Boston, del.	25.12	.....	.....	.....
Chicago, del.	24.22	.....	.....	.....
Cincinnati, del.	24.06	22.60	.....	.....
Cleveland, del.	24.12	23.24	.....	.....
Newark, N. J., del.	26.15	.....	.....	.....
Philadelphia, del.	25.46	24.58	.....	.....
St. Louis, del.	24.12	23.24	.....	.....
Buffalo, base	24.00	23.00	25.00	24.50
Boston, del.	25.50	25.00	26.50	26.00
Rochester, del.	25.53	.....	26.53	26.03
Syracuse, del.	26.08	.....	27.08	26.58
Chicago, base	24.00	23.50	24.50	24.00
Milwaukee, del.	25.10	24.60	25.60	25.10
Muskegon, Mich., del.	27.19	.....	.....	27.19
Cleveland, base	24.00	23.50	24.50	24.00
Akron, Canton, O., del.	25.39	24.89	25.89	25.39
Detroit, base	24.00	23.50	24.50	24.00
Saginaw, Mich., del.	26.31	25.81	26.81	26.31
Duluth, base	24.50	24.00	25.00	24.50
St. Paul, del.	26.63	26.13	27.13	26.63
Erie, Pa., base	24.00	23.50	25.00	24.50
Everett, Mass., base	25.00	24.50	26.00	25.50
Boston, del.	25.50	25.00	26.50	26.00
Granite City, Ill., base	24.00	23.50	24.50	24.00
St. Louis, del.	24.50	24.00	.....	24.50
Hamilton, O., base	24.00	23.50	.....	24.00
Cincinnati, del.	24.44	24.61	.....	25.11
Neville Island, Pa., base	24.00	23.50	24.50	24.00
‡Pittsburgh, del. No. & So. sides	24.69	24.19	25.19	24.69
Provo, Utah, base	22.00	21.50	.....	.....
Sharpsville, Pa., base	24.00	23.50	24.50	24.00
Sparrows Point, Md., base	25.00	24.50	.....	.....
Baltimore, del.	25.99	.....	.....	.....
Steelton, Pa., base	.....	24.50	.....	25.50
Swedeland, Pa., base	25.00	24.50	26.00	25.50
Philadelphia, del.	25.84	25.34	.....	26.34
Toledo, O., base	24.00	23.50	24.50	24.00
Mansfield, O., del.	25.94	25.44	25.44	25.94
Youngstown, O., base	24.00	23.50	24.50	24.00

*Basic silicon grade (1.75-2.25%), add 50c for each 0.25%. †For phosphorus 0.70 and over deduct 38c. ‡Over 0.70 phos. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

Note: Add 50 cents per ton for each 0.50% manganese over 1.00%.

High Silicon, Silvery

6.00-6.50 per cent (base)	$29.50		
6.51-7.00	$30.50	9.01- 9.50	$35.50
7.01-7.50	31.50	9.51-10.00	36.50
7.51-8.00	32.50	10.01-10.50	37.50
8.01-8.50	33.50	10.51-11.00	38.50
8.51-9.00	34.50	11.01-11.50	39.50

F.o.b. Jackson county, O., per gross ton. Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

Charcoal Pig Iron

Northern

Lake Superior Furn.	$28.00
Chicago, del.	31.34

(For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn.	$28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn.	33.00

Gray Forge

Neville Island, Pa.	$23.50
Valley, base	23.50

Low Phosphorus

Basing points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50 base; $30.74, delivered, Philadelphia.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorus content of 0.70% and over.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Pittsburgh Coke & Iron Co. (Sharpsville, Pa. furnace only) and Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton, effective April 20, 1942. Chester, Pa., furnace of Pittsburgh Coke & Iron Co. may exceed basing point prices by $2.25 per ton, effective July 27, 1942.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick	
Super Quality	
Pa., Mo., Ky.	$64.60
First Quality	
Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30
New Jersey	56.00
Ohio	43.00
Second Quality	
Pa., Ill., Md., Mo., Ky.	46.55
Alabama, Georgia	38.00
New Jersey	49.00
Ohio	36.00
Malleable Bung Brick	
All bases	$59.85
Silica Brick	
Pennsylvania	$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30
Ladle Brick	
(Pa., O., W. Va., Mo.)	
Dry press	$31.00
Wire cut	29.00
Magnesite	
Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00
Basic Brick	
Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.	
Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	$25.00-28.00
Do., barge	25.00-28.00
No. 2 lump	25.00-28.00

(Prices effective Nov. 23, 1942)

Ferroalloy Prices

Ferromanganese: 78-82%, carlots, gross ton, duty paid, Atlantic ports, $135; Del. Pittsburgh $140.33; f.o.b. Southern furnaces $135; Add $6 per gross ton for packed carloads $10 for ton, $13.50 for less-ton.

Spiegeleisen: 19-21%, carlots per gross ton, Palmerton, Pa. $35 to $212.

Electrolytic Manganese: 99.9% plus, less ton lots, per lb. 37.6 cents.

Electric Furnace Ferromanganese: 10.40c to 26.50c per lb. cont. Mn. Same zones and differentials as Silicomanganese.

Chromium Metal: Per lb contained chromium in gross ton lots, contract basis, freight allowed, 98% 80.00c, 98% 79.00c. Spot prices 5 cents per lb. higher.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, f.o.b. Niagara Falls, N. Y. $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochromium: Carloads f.o.b. shipping point, freight allowed; eastern zone, high-carbon standard, 13-14½c per lb. Cr. cont., according to crushed size; high-carbon S. M., 14-15½c; high-carbon high-nitro, 18-19½c; high-carbon foundry, 13½-14c; low-carbon standard, 10 grades, 19½ to 54c; low-carbon S. M., 20-49c; low-carbon high-nitro, 2c over low-carbon standard; chromium metal, 78½c to 99½c; central zone add .4c lb. for carloads, .65c for l.c.l. on ferrochromium, .15c. carloads, 2.5c l.c.l. on chromium metal; western zone add 1c for carloads, 1.85c, l.c.l. on ferrochromium, 2.75c carloads, 4.75c l.c.l. on chromium metal.

Chromium briquets: Contract basis in carloads per lb., freight allowed 8.25c; packed 8.50c; gross ton lots 8.75c; less-ton lots 9.00c; less 200-lb. lots 9.25c. Spot prices ¼-cent higher.

Ferromolybdenum: 55-75%, per lb. contained molybdenum, f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Calcium Molybdate (Molyte): 40-45%, per lb. contained molybdenum, contract basis, f.o.b. Langeloth and Washington, Pa., any quantity, 80.00c.

Molybdic Oxide Briquets: 48-52%, per lb. contained molybdenum, f.o.b. Langeloth, Pa., any quantity 80.00c.

Molybdenum Oxide: 53-63%, per lb. contained molybdenum in 5 and 20 lb. molybdenum contained cans, f.o.b. Langeloth and Washington, Pa., any quantity 80.00c.

Molybdenum Powder: 99% per lb. in 200-lb. kegs, f.o.b. York, Pa. $2.60; 100-200 lb. lots $2.75; under 100-lb. lots $3.00.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrophosphorus: 23-26%, based on 24% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Mt. Pleasant, Tenn.; contract price $75, spot $80.

Ferrosilicon: Carloads, unpacked, Eastern zone, 25%, 9.75c to 12.15c lb. Si. contained; 50%, 6.65c to 8.10c; 60% 7.70c to 9c; 75% 8.05c to 9.05c; 85% 8.90c to 9.85c; 95% 11.05c to 12.45c, according to crushed size. Central zone add .15c to .80c lb. cont. Si., l.c.l. add .45c to 3.35c; Western zone add .6c to 2c, l.c.l. 9c to 11.05c. Prices F.O.B. shipping point, freight allowed to destination.

Silicon Metal: 96% Si. 2% Fe. max., 12.50c to 14.85c per lb.; 97% Si. 1% Fe., 12.90c to 16.25c per lb., according to crushed size, f.o.b. shipping point, freight allowed.

Silicon Briquets: Contract basis; in carloads, bulk freight allowed, per ton $74.50; packed $80.50; ton lots $84.50; less-ton lots per lb. 4.00c; less 200-lb. lots per lb. 4.25c. Spot ¼-cent per lb. higher on less-ton lots; $5 per ton higher on ton lots and over.

Silicomanganese: Same zones as ferrosilicon, eastern zone, 5.3c to 7c per lb.; central zone, add 1.4c to 1c per lb.; western zone, add 55.c to 3.05c per lb.

Standard Ferromanganese Briquets: 6.05c per lb. Same zones and differentials as Silicomanganese.

Ferrotungsten: Carlots, per lb. contained tungsten, $1.90.

Tungsten Metal Powder: 98-99%, per lb. any quantity $2.55-2.65.

Ferrotitanium: 40-45%, f.o.b. Niagara Falls, N. Y., per lb. contained titanium; ton lots $1.23; less-ton lots $1.25. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20%, contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Ferrovanadium: 35-40%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Vanadium Pentoxide: Technical grade, 88-92 per cent V_2O_5; contracts, any quantity, $1.10 per pound V_2O_5 contained; spot 5 cents up.

Zirconium Alloys: 12-15%, contract basis, carloads bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot $5 per ton higher.

Zirconium alloy: 35-40%, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼-cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) contract basis, f.o.b. Niagara Falls, N. Y., per lb. 7.50c; ton lots 8.00c. Spot ¼-cent higher.

Simanal: (Approx. 20% each silicon, manganese, aluminum) Contract basis, freight allowed, per lb. of alloy; carlots 10.00c; ton lots 10.50c, less ton lots, 11.00c.

Boroll: 3 to 4% boron, 40 to 45% Si., $7 lb. cont Bo., f.o.b. Philo, O.

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	NE hot bars 8600 series	NE hot bars 9400 series
Boston	4.044[1]	3.912[1]	3.912[1]	5.727[1]	3.774[1]	4.106[1]	5.106[1]	5.224[14]	4.744[14]	4.144[11]	4.715	7.762[23]	6.062[23]
New York	3.853[1]	3.758[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[23]	4.618[16]	4.108[23]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[23]	4.618[16]	4.108[23]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.605[1]	5.272[1]	3.518[1]	3.922[1]	4.272[1]	5.018[13]	4.872[23]	4.072[23]	4.772	7.506[23]	5.806[23]
Baltimore	3.802[1]	3.759[1]	3.594[1]	5.252[1]	3.394[1]	3.902[1]	4.252[1]	4.894[1]	4.852[23]	4.052[23]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.796[1]	5.341[1]	3.596[1]	4.041[1]	4.391[1]	5.196[17]	4.841[20]	4.041[23]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	3.971[1]	5.465[1]	3.771[1]	4.165[1]	4.515[1]	5.371[17]	4.965[24]	4.165[23]	.....	.....	.....
Bethlehem, Pa.*	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.35[1]	3.40[1]	3.63[1]	5.26[1]	3.35[1]	3.819[1]	3.819[1]	4.75[15]	4.40[10]	3.75[23]	4.66	7.35[23]	5.65[23]
Buffalo (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.81[1]	3.81[1]	4.65[15]	4.30[10]	3.65[23]	4.55	7.35[23]	5.65[23]
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[15]	4.40[24]	3.75[23]	....	7.45[23]	5.75[23]
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[15]	4.30[24]	3.65[23]	....	.....	.....
Cleveland (city)	3.35[1]	3.588[1]	3.40[1]	5.188[1]	3.35[1]	3.60[1]	3.60[1]	4.877[15]	4.40[24]	3.75[23]	4.45	7.556[23]	5.856[23]
Cleveland (country)	3.25[1]	.....	3.30[1]	.....	3.25[1]	3.50[1]	3.50[1]	.	4.30[24]	3.65[23]	4.35[23]	.....	.....
Detroit	3.450[1]	3.661[1]	3.609[1]	5.251[1]	3.450[1]	3.700[1]	3.700[1]	5.000[13]	4.500[24]	3.800[23]	4.659	7.680[23]	5.980[23]
Cincinnati	3.611[1]	3.691[1]	3.661[1]	5.291[1]	3.425[1]	3.675[1]	3.675[1]	4.825[19]	4.475[24]	4.011[23]	4.711	6.10	6.20
Youngstown, O.*	.....	.....	.....	.....	.....	.....	.	4.40[15]	.....	.....	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.25[1]	3.50[1]	3.50[1]	4.65[15]	.....	.....	.....	.....	.....
Chicago (city)	3.30[1]	3.55[1]	3.35[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	5.231[15]	4.20[24]	3.75[23]	4.65	5.75[23]	5.85[23]
Chicago (country)	3.40[1]	3.45[1]	3.45[1]	5.05[1]	3.15[1]	3.50[1]	3.50[1]	4.85[15]	4.10[24]	3.65[23]	4.55	5.75[23]	5.85[23]
Milwaukee	3.637[1]	3.687[1]	3.687[1]	5.287[1]	3.387[1]	3.737[1]	3.737[1]	5.272[15]	4.337[24]	3.887[23]	4.787	5.987[23]	6.087[23]
St. Paul	3.75[3]	3.80[3]	3.80[3]	5.40[3]	3.50[3]	3.85[3]	3.85[3]	5.00-	4.35[3]	4.34[23]	3.83	7.70[23]	6.00[23]
St. Louis	3.64[1]	3.69[1]	3.69[1]	5.29[1]	3.39[1]	3.74[1]	3.74[1]	4.99[15]	4.24[24]	4.02[23]	3.61	7.72[23]	6.02[23]
Indianapolis (city)	3.60[1]	3.70[1]	3.70[1]	5.30[1]	3.45[1]	3.75[1]	3.75[1]	5.01[19]	4.25[24]	3.97[23]	.....	.....	.....
Indianapolis (country)	3.35[1]	3.45[1]	3.40[1]	5.05[1]	3.20[1]	3.50[1]	3.50[1]	5.01[19]	4.00[24]	3.97[23]	.....	.....	.....
Memphis, Tenn.	3.90[3]	3.95[3]	3.95[3]	5.71[3]	3.85[3]	4.10[3]	4.10[3]	5.25[21]	4.66[24]	4.31[23]	.....	.....	.....
Birmingham (city)	3.50[3]	3.55[3]	3.55[3]	5.83[3]	3.45[3]	3.70[3]	3.70[3]	4.75[19]	4.78[24]	4.43[23]	.....	.....	.....
Birmingham (country)	3.40[3]	3.45[3]	3.45[3]	5.83[3]	3.35[3]	3.60[3]	3.60[3]	4.75[19]	4.78[24]	4.43[23]	.	.....	.....
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.85[4]	3.95[4]	4.20[4]	4.20[4]	5.25[20]	4.95[19]	4.60[23]	5.00	.....	.....
New Orleans (country)	4.00[4]	3.80[4]	3.80[4]	5.75[4]	3.85[4]	4.10[4]	4.10[4]	5.15[20]	4.95[19]	4.60[23]	.....	.....	.....
Houston, Tex.	3.75[3]	4.25[3]	4.25[3]	5.50[3]	3.75[3]	4.30[3]	4.30[3]	5.25[20]	5.43[19]	4.50[23]	....	.....	.....
Los Angeles	4.35[4]	4.60[4]	4.90[4]	7.15[4]	4.95[4]	4.90[4]	6.70[4]	5.95[19]	7.15[4]	5.70[23]	.....	9.55[23]	8.55[23]
San Francisco (city)	3.95[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	4.50[7]	6.60[19]	7.55[19]	5.55[19]	.....	9.80[3]	8.80[3]
San Francisco (country)	3.85[7]	4.25[7]	4.55[7]	6.25[7]	4.45[7]	4.40[7]	4.40[7]	6.50[19]	7.45[19]	5.45[19]	.....	.....	.....
Tacoma	4.20[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.70[3]	6.63[24]	5.75[19]	.....	.....	.....
Seattle (city)	4.20[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.35[6]	5.45[6]	5.70[6]	6.63[24]	5.75[19]	.....	.....	8.60[3]

*Basing point cities, with quotations representing mill prices, plus warehouse spread.

NOTE—All prices fixed by Office of Price Administration in amendments Nos. 10 to 16 to Revised Price Schedule No. 49. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES

[1]—400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 3999 pounds; [6]—300 to 1999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1000 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base.

Ores

Lake Superior Iron Ore
Gross ton, 51½% Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore
Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	13.00

Foreign Ore
Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00c

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore
(Equivalent OPA schedules):
Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.
(S/S paying for discharging; dry basis; subject to penalties if guarantees are not met.)

Indian and African 48% 2.8:1	$41.00
48% 3:1	43.50
48% no ratio	31.00
South African (Transvaal) 44% no ratio	27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80
Brazilian—nominal 44% 2.5:1 lump	33.65
48% 3:1 lump	43.50
Rhodesian 45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50
Domestic (seller's nearest rail) 48% 3:1	52.80
less $7 freight allowance	

Manganese Ore
Including war risk but not duty, cents per gross-ton unit, dry, f.o.b. cars, New Orleans and Mobile; 5 cents higher at Norfolk, Baltimore, Philadelphia, New York; adjustments for analysis variations. (Based on OPA schedules.)

Brazilian, 48%	73.8c
Brazilian, 46%	71.8c
Caucasian, 51%	75.3c
Caucasian, 50%	74.8c
Chilean, 48%	73.8c
Indian, 50%	74.8c
Indian, 48%	73.8c
South African, 48%	73.8c
South African, 46%	71.8c
(Duty Free)	
Cuban, 51%	86.5c
Cuban, 48%	85.0c
Cuban, 45%	82.0c
Philippine, 50%	85.0c
Domestic, 48%, f.o.b. mines	100.0c

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Designation	Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Basic open-hearth Bars per 100 lb.	Basic open-hearth Billets per G T	Electric furnace Bars per 100 lb.	Electric furnace Billets per G T
	Chemical Composition Limits, Per Cent									
NE 1330	.28-.33	1.60-1.90	.20-.35	.....	.....	.....	$ .10	$2.00	...	.....
NE 8020	.18-.23	1.00-1.30	.20-.35	.....	.....	.10-.20	.45	9.00	$.95	$19.00
NE 8442	.40-.45	1.30-1.60	.20-.35	.....	.....	.30-.40	.90	18.00	1.40	28.00
NE 8613	.12-.17	.70- .90	.20-.35	.40-.60	.40-.70	.15-.25	.75	15.00	1.25	25.00
NE 8720	.18-.18	.70- .90	.20-.35	.40-.60	.40-.70	.20-.30	.80	16.00	1.30	26.00
NE 9253	.50-.60	.75-1.00	1.80-2.20	.....	.....	.....	.40	8.00	...	.....
NE 9262	.55-.65	.75-1.00	1.80-2.20	.20-.40	.....	.....	.65	13.00	....	.....
NE 9415	.13-.18	.80-1.10	.40-.60	.20-.40	.20-.50	.08-.15	.80	16.00	1.30	26.00
NE 9442	.40-.45	1.00-1.30	.40-.60	.20-.40	.20-.50	.08-.15	.85	17.00	1.35	27.00
NE 9537	.35-.40	1.20-1.50	.40-.60	.40-.60	.40-.70	.15-.25	1.20	24.00	1.70	34.00
NE 9630	.28-.33	1.20-1.50	.40-.60	.40-.60	.....	.....	.80	16.00	1.30	26.00
NE 9642	.40-.45	1.30-1.60	.40-.60	.40-.60	.....	.....	.85	17.00	1.35	27.00

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices and consumers' delivered prices are to be computed. Scrap originating from railroads quoted delivered to consumers' plants located on the line of the railroad from which the material originated. All prices in gross tons. A basing point includes its switching district.

PRICES FOR OTHER THAN RAILROAD SCRAP

					ELECTRIC FURNACE, ACID OPEN-HEARTH AND FOUNDRY GRADES									
					Low Phos. Grades									
	OPEN HEARTH GRADES*	Mixed Bor., Turn., Machine Turnings	Cast Iron Borings	Shoveling Turnings	Billet, Bloom Forge Crops	Bar Crops and smaller; Punchings, Plate	Heavy Structural, Plate 3 ft. and less	2 ft. and less	1 ft. and less	Foundry Steel 2 ft. and less	1 ft. and less	Alloy-Free Low Phos. & Sulphur Turnings	First Cut Heavy Axle & Forge Turnings	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Johnstown, Midland, Monessen, Sharon, Steubenville, Weirton, Canton, Youngstown, Warren	$20.00	$15.00	$16.00	$17.00	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$18.00	$19.50	$21.00
Claymont, Coatesville, Harrisburg, Conshohocken, Phoenixville	18.75	13.75	14.75	15.75	23.75	21.25	20.25	20.75	21.25	20.25	20.75	16.75	18.25	19.75
Bethlehem	18.25	13.25	14.25	15.25	23.25	20.75	19.75	20.25	20.75	19.75	20.25	16.25	17.75	19.25
Buffalo	19.25	14.25	15.25	16.25	24.25	21.75	20.75	21.25	21.75	20.75	21.25	17.25	18.75	20.25
Cleveland, Middletown, Cincinnati, Portsmouth, Ashland	19.50	14.50	15.50	16.50	24.50	22.00	21.00	21.50	22.00	21.00	21.50	17.50	19.00	20.50
Detroit	17.85	12.85	13.85	14.85	22.85	20.35	19.35	19.85	20.35	19.35	19.85	15.85	17.35	18.85
Toledo	†15.35	12.85	13.85	14.85										
Chicago	18.75	13.75	14.75	15.75	23.75	21.25	20.25	20.75	21.25	20.25	20.75	16.75	18.25	19.75
Kokomo	18.25	13.25	14.25	15.25	23.25	20.75	19.75	20.25	20.75	19.75	20.25	16.25	17.75	19.25
Duluth	18.00	13.00	14.00	15.00	23.00	20.50	19.50	20.00	20.50	19.50	20.00	16.00	17.50	19.00
St. Louis	17.50	12.50	13.50	14.50	22.50	20.00	19.00	19.50	20.00	19.00	19.50	15.50	17.00	18.50
Birmingham, Atlanta, Alabama City, Los Angeles, San Francisco, Pittsburg, Calif.	17.00	12.00	13.00	14.00	22.00	19.50	18.50	19.00	19.50	18.50	19.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	12.50	13.50	21.50	19.00	18.00	18.50	19.00	18.00	18.50	14.50	16.00	17.50
Seattle	14.50	9.50	10.50	11.50	19.50	17.00	16.00	16.50	17.00	16.00	16.50	12.50	14.00	15.50

RAILROAD SCRAP

	Heavy Melting Steel	Scrap Rails	Rails for Rolling	Scrap Rails 3 ft. and under	Scrap Rails 2 ft. and under	Scrap Rails 18 in. and under
Pittsburgh, Wheeling, Steubenville, Sharon, Youngstown, Canton	$21.00	$22.00	$23.50	$24.00	$24.25	$24.50
Philadelphia, Wilmington, Sparrows Point	19.75	20.75	22.25	22.75	23.00	23.25
Cleveland, Cincinnati, Middletown, Ashland, Portsmouth	20.50	21.50	23.00	23.50	23.75	24.00
Chicago	19.75	20.75	22.25	22.75	23.00	23.25
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Kokomo	19.25	20.25	21.75	22.25	22.50	22.75
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00
Birmingham	18.00	19.00	20.50	21.00	21.25	21.50
Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Seattle	15.50	16.50	18.00	18.50	18.75	19.00

CAST IRON SCRAP OTHER THAN RAILROAD

(Shipping point prices in gross tons)

	Group A	Group B	Group C
No. 1 Cupola Cast	$18.00	$19.00	$20.00
No. 1 Machinery Cast, Drop Broken, 150 lbs. & Under	18.00	19.00	20.00
Clean Auto Cast	18.00	19.00	20.00
Stove Plate	17.00	18.00	19.00
Unstripped Motor Blocks	15.50	16.50	17.50
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Miscellaneous Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C includes states not named in groups A and B, plus Kansas City, Kans.-Mo.

*Open Hearth Grades refer to No. 1 heavy melting steel, No. 1 hydraulic compressed black sheet scrap, No. 2 heavy melting steel, dealers' No. 1 bundles, dealers' No. 2 bundles and No. 1 busheling. No. 1 chem. borings, 1 per cent oil, $1 under, No. 2, 1.5 per cent oil, $2 under heavy melting steel. No. 3 bundles, $2 under No. 1 heavy melting; cast steel, $2.50 over, No. 2 busheling, $2.50 under No. 1 heavy melting steel, auto springs, crankshafts, $1 over No. 1 heavy melting. †Toledo open-hearth grades cover only No. 2 busheling.

A basing point includes the switching district of the city named. The Pittsburgh basing point includes the switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Pa. Cincinnati includes Newport, Ky. St. Louis basing point includes Granite City, East St. Louis and Madison, Ill. San Francisco includes South San Francisco, Niles and Oakland, Calif. Chicago includes Gary, Ind. Claymont, Del., includes Chester, Pa.

Inferior Grades: Maximum prices of inferior grades shall continue to bear the same differential below the corresponding listed grades as existed from Sept. 1, 1940, to Jan. 31, 1941. No premium allowed on grades considered superior, unless approved by OPA. Addition of special preparation charges prohibited. Purchase of electric furnace or foundry grades for open hearth or blast furnace use permitted only at no more than price for corresponding open hearth grade. Exceptions: Low phos. billet, bloom and forge crops and electric furnace bundles may exceed open hearth price, and electric furnace bundles may exceed blast furnace price, if material is delivered to the consumer direct from the original industrial producer.

Commissions: No commission is payable except by a consumer to a broker for services rendered, the commission not to exceed 50 cents per gross ton. No commission is payable unless: The broker guarantees the quality and delivery of an agreed tonnage the scrap is purchased at a price no higher than the maximum allowed; the broker sells the scrap to the consumer at the same price at which he purchased it; the broker does not split the commission with the seller of the scrap, with another broker or sub-broker, or with the consumer. Commissions must be shown as separate item on invoice.

Maximum Shipping Point Price: Where shipment to consumer is by rail, vessel or combination of both, scrap is at its shipping point when it has been placed f.o.b. railroad car or f.a.s. vessel. In such cases, maximum shipping point prices are: (1) For shipping points located within a basing point, the price listed in the above table for scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point; and (2) for shipping points located outside a basing point, the price in the above table for scrap at the most favorable basing point, minus the lowest transportation charge by rail, water or combination thereof. When vessel movement is involved, dock charges shall be 50 cents at Memphis, $1 at Great Lakes ports, $1.25 at New England ports, 75 cents elsewhere. New England shipping point prices computed on most favorable basing point prices; maximum transportation charge on scrap from New England, $6.65 per ton.

Scrap shipped by motor vehicle is at its shipping point when loaded. For shipping points within basing points, maximum is price listed in table minus lowest switching charge. When outside basing point, maximum is price at most favorable basing point minus lowest established charge when hauled by common carrier. When hauled by seller charges are based on carload rate for rail shipment, minimum $1.00 per ton.

Maximum Delivered Prices: Determined by adding established transportation charges to shipping point price, not to exceed by more than $1 (plus freight rate increase March 18, 1942) the prices listed in the table for the nearest basing point. Certain exceptions specified in Revised Price Schedule No. 4 (Amendment 1) apply to St. Louis district consumers, to WPB allocations, to water shipments from Duluth or Superior, Wis., to shipments of billets, blooms and forge crops from Pittsburgh and to shipments of electric and foundry grades from Michigan; to shipments of turnings to ferroalloy producers and of borings to chemical users. Delivered prices of scrap shipped under WPB allocations may exceed prices at nearest basing point by more than $1, if most economical transportation is used.

Unprepared Scrap: Above prices are for prepared scrap. Maximum prices for unprepared scrap are $3.50 less; (material from which Nos. 1, 2 and 3 bundles made is $4 less) than for the corresponding grades of prepared scrap, except for heavy breakable cast. In no case shall electric furnace and foundry grades be used as the "corresponding grades of prepared scrap."

Remote Scrap: Consists of all grades, except railroad scrap, in Florida, Montana, Idaho, Wyoming, Nevada, Arizona, New Mexico, Texas, Oklahoma, Oregon, Washington, Louisiana, Utah, Arkansas, Nebraska, Kansas. Delivered price may exceed by not more than $7 the price at the basing point nearest consumer's plant, provided sworn details furnished OPA. Permission required to exceed by more than $7 the nearest basing point price. Colorado is remote for Colorado consumers only.

LOGEMANN
Presses for Sheet Scrap

THE NATION NEEDS YOUR SHEET SCRAP!

In mills, industrial plants and scrap yards, LOGEMANN SCRAP PRESSES are working day and night to prepare sheet scrap for the furnaces.

Sheet mills particularly recognize the value of the years of experience and the performance records which back up LOGEMANN designs and workmanship.

The line includes scrap presses *designed for mill Service,* presses *designed for automobile plant conditions,* presses *designed for general plant applications.* Write for details.

The scrap press illustrated operates in one of the largest industrial plants. Compresses scrap from three directions to produce high-density mill size bundles. Built in various capacities.

LOGEMANN BROTHERS COMPANY
3126 W. Burleigh St. Milwaukee, Wisconsin

NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12.12½, refinery; dealers may add ¼c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1½c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more, 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 12.25c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 14.25c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, corroding or chemical, 6.40c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey, New York State, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester-Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 lbs.; 1c less than 2000 lbs.

Secondary Aluminum: All grades 14.00c per lb. except as follows: Low-grade piston alloy (No. 122 type) 13.50c; No. 12 foundry alloy (No. 2 grade) 13.50c; chemical warfare service ingot (92½% plus) 13.50c; steel deoxidizers in notchbars, granulated or shot, Grade 1 (95-97½%) 13.50c, Grade 2 (92-95%) 13.50c, Grade 3 (90-92%) 13.00c, Grade 4 (85-90%) 12.50c; any other ingot containing over 1% iron, except PM 754 and hardeners, 13.50c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.) 20.50c lb.; add 1c for special shapes and sizes, including 3-lb. ingot and 12-lb. round ingot; incendiary bomb alloy 23.40c, 50-50 magnesium-aluminum 23.75c, ASTM B80-41T No. 11 25.00c, ASTM B94-40T No. 13 25.00c, all others 23.00c. Prices for 100 lbs. or more; for 25-100 lbs. add 10c; for less than 25 lbs. 20c; incendiary bomb alloy f.o.b. plant any quantity; carload freight rate allowed all others for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.75-99.79% incl. 51.62½c; Grade C, Cornish refined 51.62½c; Grade D, 99.0-99.74% incl. 51.12½c; Grade E, below 99%, 51.00c.

Antimony: American, bulk, carlots, f.o.b. Laredo, Tex., 99.0-99.8% grade 14.50c, 99.8% and over (arsenic 0.05% max.; no other impurity to exceed 0.1% 15.00c. Add ¼c for less-carlots to 10,000 lbs.; ½c for 9999-224 lbs.; 2c for 223 lbs. and less.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: Prices per 76-lb. flask f.o.b. point of shipment or entry. Domestic produced in Calif., Oreg., Wash., Idaho, Nev., Ariz. $191; produced in Texas, Ark. $193. Foreign, produced in Mexico, duty paid, $193.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $15 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $2.11 lb.; 100 lbs. or more on contract, $1.50 lb.

Indium: 99.5%, $10 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 44.75c per ounce.

Platinum: $36 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass, 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A, B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.01c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.40c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Herculoy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 28.75c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c, Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.98c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Bare, soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlots 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s, flat, mill finish, base 30,000 lbs. or more; del.; sheet widths as indicated; circle diameters 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.50c Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%. Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2% 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c.

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu; 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c f.o.b. Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled, depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c, del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del.; ton lots 33.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 33.00c, f.o.b. Niagara Falls.

Scrap Metals

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ⅝c for 15,000-40,000 lbs.; 1c for 40,000 lbs. or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.875
Commercial bronze 90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz metal	8.000	7.750	7.250
Nickel Sil., 5%	9.250	9.000	4.625
Phos. br., A. B. 5%	11.00	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	3.000	7.500

Other than Brass Mill Scrap: prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ⅝c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbitt-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 8.00c; Muntz metal condenser tubes 7.50c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Prices f.o.b. point of shipment, respectively for lots of less than 1000 lbs.; 1000-20,000 lbs. and 20,000 lbs. or more, plant scrap only. Segregated solids: S-type alloys (2S, 3S, 17S, 18S, 24S, 32S, 52S) 9.00c, 10.00c, 10.50c; All other high grade alloys 8.50c, 9.50c, 10.00c; low grade alloys 8.00c, 9.00c, 9.50c. Segregated borings and turnings: Wrought alloys (17S, 18S, 32S, 52S) 7.50c, 8.50c, 9.00c; all other high grade alloys 7.00c, 8.00c, 8.50c; low grade alloys 6.50c, 7.50c, 8.00c. Mixed plant scrap, all solids, 7.50c, 8.50c, 9.00c; borings and turnings 5.50c, 6.50c, 7.00c.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings, old zinc 7.25c f.ob. point of shipment; add ½-cent for 10,000 lbs. or more. New die-cast scrap, radiator grilles 4.95c; add ½c 20,000 or more. Unsweated zinc dross, die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

OPA Sets Specific Ceiling Prices For Manganese Alloys and Metals

New specific maximum prices have been established, effective July 1, for ferromanganese, manganese alloys and metals. Revised regulation No. 138, says Office of Price Administration, makes pricing simpler for both buyers and sellers, for it reduces some 1300 different prices previously existing to a little over 100.

High Carbon Ferromanganese

Maximum base contract prices for high carbon standard ferromanganese, with a base analysis of 78 to 82 per cent manganese content are:

Bulk carload lots, $135.00 to $159.00 per gross ton, according to crushed size.

Domestic packing (packed in barrels), carload lots, $141.00 to $165.00 per gross ton, according to crushed size.

Domestic packing, gross ton lots, $145.00 to $176.00 per gross ton, according to crushed size.

Domestic packing, less than gross ton lots, $148.50 to $208.50 per gross ton, according to crushed size.

Premiums of $1.70 per gross ton may be added to the foregoing prices for each one per cent of manganese content in excess of 82 per cent, and penalties of $1.70 per gross ton must be deducted for each one per cent of manganese content below 78 per cent.

Maximum prices for standard ferromanganese, except on sales by two southern producers, may be made f.o.b. Baltimore, Philadelphia or New York, whichever is most favorable to the buyer, instead of the f.o.b. Atlantic Seaboard base provided previously. This change is made in the revised regulation to bring basing point provisions into conformity with industry practice.

Substandard ferromanganese has a manganese content of less than 75 per cent, or excessive impurities. Maximum prices for the substandard grade are the base prices for the standard grade, less $10.00 per gross ton.

Briquets and Electric Furnace

Maximum prices for briquets, electric furnace manganese, silicomanganese and manganese metal are established on a zone basis similar to that provided recently for ferrosilicon, ferrochromium, and chromium metal.

Maximum base contract prices for delivery in the Eastern zone, in carload lots, bulk, are:

Electric furnace manganese, 10.40 cents to 26.50 cents per pound of contained manganese, according to carbon content and crushed size.

Silicomanganese, 5.30 cents to 7 cents per pound of material, according to silicon content and crushed size.

Standard ferromanganese briquets 6.05 cents per pound of briquet, gross weight.

Manganese metal, 35.6 cents to 43.1 cents per pound of metal, gross weight according to manganese content and crushed size. For electrolytic manganese metal, the maximum price is 37.6 cents per pound of metal, gross weight.

Central zone prices are the eastern base prices plus differentials ranging from 1.25 to 1 cent a pound, according to product and size of shipment.

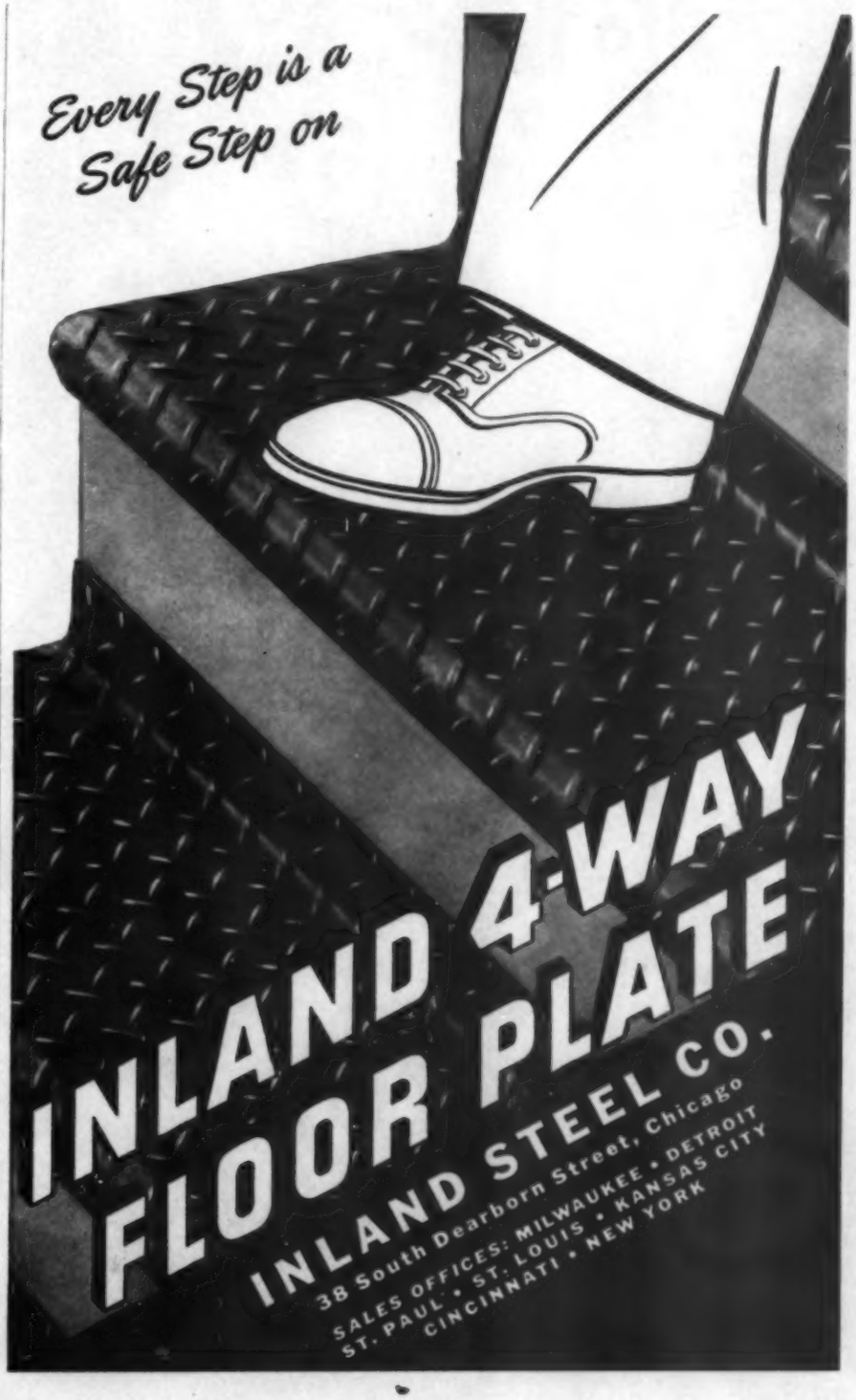
Western prices are the eastern prices plus differentials ranging from 0.55 of a cent to 3.05 cents a pound, according to product and size of shipment.

Maximum prices for spiegeleisen, a low-manganese-content alloy, range from $35.00 to $212.00 per gross ton, f.o.b. Palmerton, Pa., according to manganese content, crushed size, and quantity of shipment.

Warehousemen May Charge Premiums for Chromium

Office of Price Administration has announced a schedule of premium or differentials which independent warehousemen may charge in sales of ferrochromium and chromium metal. The premiums provided in amendment No. 1 to maximum price regulation No. 407 became effective July 1.

The amendment provides that maxi-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mum prices at which independent warehousemen may sell ferrochromium or chromium metal shall be the producers' maximum prices to the warehousemen plus 10 per cent for quantities of 500 lb. and over, 15 per cent for amounts of 100 to 500 lb., and 20 per cent for amounts less than 100 lb.

Originally the regulation made no provision for premiums for ferrochromium and chromium metal when sold by independent warehousemen.

The amendment also provides a premium of 1½ cents per pound on carload lot sales of chromium metal in the Central zone, and 2¾ cents per pound in the Western zone. Chromium metal is produced only in the Eastern zone, and it was intended to provide these premiums in the regulation, but they were omitted by clerical error.

Ceiling Prices Set for Basic Refractory Products

Basic refractory brick, dead-burned dolomite, dead-burned grain magnesite, and kindred basic refractory products have been placed under a separate price regulation, No. 416, effective July 3. Provisions governing sale of refractory chrome ores are restated in a special appendix. Refractory chrome ores remain under maximum price regulation No. 258, but the provisions are reprinted for the convenience of the industry.

Price levels, which have undergone no change since October 1941, are not altered by the action although specific dollars and cents prices replace "freeze" prices. The new order incorporates the industry's practices regarding transportation charges and pricing customs as were in effect during the September or October, 1941 periods.

The regulation covers sales in any quantity shipped from any of the industry's three basing points—Baltimore, Md.; Chester, Pa.; and Plymouth Meeting, Pa. A small quantity of sales, amounting to less than 2 per cent of the total, is made from dealer or factory warehouses located at places other than plant sites, and these sales remain under the provisions of maximum price regulation No. 188.

Sales of dead-burned dolomite by carload quantities in bulk or in any type of package are covered, and prices are established at the levels prevailing Sept. 1, 1941, which are identical with prices frozen as the maximum under the general maximum price regulation, except that they are specifically stated. In addition, the regulation spells out the freight practices.

The base prices per short ton range from $9.30 to $9.50 for bulk shipments. The maxnmum price for shipments in heavy paper bags is $15.00 per net ton, in line with industry practice in the period Oct. 1-15, 1941.

Maximum dollar-and-cents prices are set forth for maintenance grades of domestic dead-burned grain magnesite, special furnace magnesite, furnace magnesite, magnesite hearth ramming mix and periclase.

All of the material is sold on a single basing point system, Chewelah, Wash., being the basing point. The State of Washington is the principal source of supply, although small amounts are also produced in California, Ohio and West Virginia.

Sheets, Strip . . .

Sheet & Strip Prices, Page 150

Sheet buying continues well sustained. No outstanding tonnages have been placed, but the number of orders has been sufficient to keep volume at a high level. Cancellations as a result of cutbacks have virtually disappeared. One exception was a recent cancellation of a considerable tonnage of galvanized sheets, reflecting a change in emphasis from life boats to life rafts.

Meanwhile, deliveries continue to tighten, some producers having nothing to offer in either hot or cold-rolled sheets until November. The galvanized sheet situation has tightened perceptibly, with little available anywhere for third quarter.

Sellers report some inquiry for post-war delivery. No orders are being entered but some are being placed on file, with sellers in the main endeavoring to discourage such inquiry. They point out that they will be just as anxious to serve their customers promptly as their customers will be to serve their own trade, but that it is too early for definite commitments.

As a matter of fact, most inquiries for post-war tonnage appear to be prompted primarily by a desire on the part of consumers to feel out sellers as to what they

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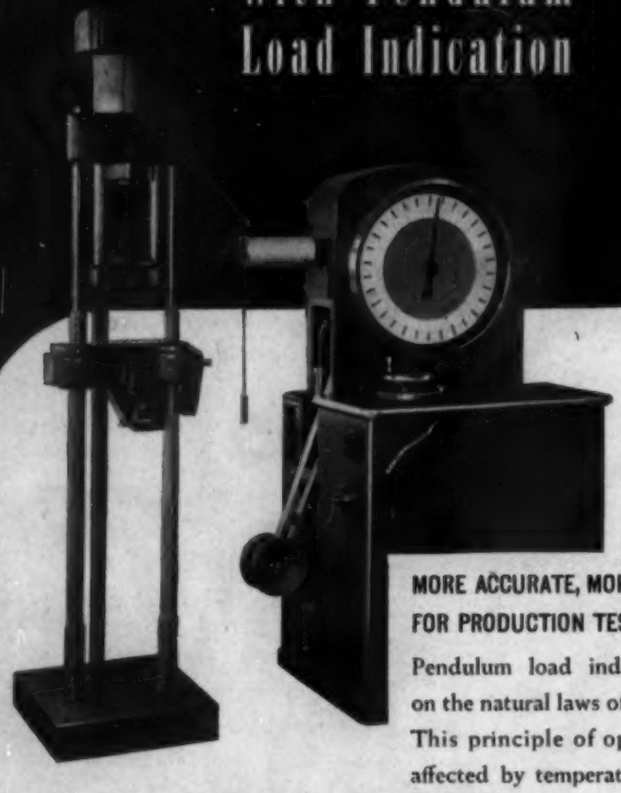

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may be planning in the way of special steels of interest to them. While sellers are discouraging postwar demand, they are nevertheless equally interested in learning what their customers may have in mind for production after the war.

Deliveries of narrow hot strip, both alloys and carbon grades, to rerollers and cold-finishing departments are well maintained to schedule. Annealing equipment is heavily taxed and is a choke point in many instances. High-carbon grades predominate in many orders. Cold strip capacity open for fourth quarter is limited and some sellers are filled to quotas for that period, including alloys.

While tonnage of alloys has been reduced in directive affecting most producers, the tonnage available is practically taken for the remainder of the year. To avoid overloading on some sizes and grades and in an attempt to strike a balance in production, some sellers are turning down tonnage, but have some open for less crowded equipment; also open-hearth is sometimes substituted for electric furnace steel where possible. Demand for the major war programs accounting for the heavier tonnages is maintained with the exception of tank requirements which are substantially lower.

Bars . . .

Bar Prices, Page 150

Maritime requirements are running aircraft needs for cold-drawn bars a close race in the New York area. Tonnage for shipyards and ship accessory manufacturers has been increasing rapidly, cold drawers assert, showing a greater percentage of gain than tonnage for the aircraft industry.

Improvement in these lines is more than offsetting the drop in machine tool specifications, which has become pronounced in certain cases. One large eastern manufacturer of presses has not only not purchased cold-drawn bars in some time, but, because of the decline in his machine tool order book, has accumulated a stock which he may offer shortly for resale. This, of course, is more or less exceptional, although requirements of machine tool builders generally have slackened.

Most cold drawers now are unable to offer deliveries much before November, as their own processing schedules have become unusually extended. One difficulty in some eastern mills is increasing shortage of manpower. Due to inability to increase wage rates in their own industry because of wage freezing limitations, they are losing increasing numbers to shipyards and other war industries where basic rates are higher. Even the establishment of 10-hour shifts, which would permit workers a greater amount of overtime pay, has failed to solve the problem.

Admittedly, cold drawing operations are one of the bottlenecks in the steel industry and it is becoming increasingly obvious that this is not due alone to lack of facilities, because several cold drawers at least are not able to utilize the facilities they have, due to stringency in labor.

Hot carbon bar deliveries fall generally in October and in the larger sizes of bars no great amount can be had before November. Due to this sold-up condition new bar demand is somewhat lighter, according to some sellers, due to that and the fact that various claimant agencies have not fully released their fourth quarter allotment numbers.

Plates . . .

Plate Prices, Page 151

With pressure off for the moment from the synthetic rubber and high octane gas programs, plate mills are turning almost their entire attention to shipbuilding needs. Shipyards still report they are able to fabricate steel plate more rapidly than they can get delivery and if the figures for the claimant agencies are true, there obviously is a much greater demand for plate than the mills are capable of producing. This is one salient factor in the current WPB drive for increased volume of steel. New facilities are being rushed to completion and after many months of delay some of the new plate mills are getting assistance from the War Production Board in their effort to gather the necessary components. The slab supply held by continuous mills has been affected somewhat by the coal strike and this may possibly be translated into lower output, although other products will take the brunt of the diminished tonnage.

Pipe . . .

Pipe Prices, Page 151

Final shipments of pipe for the "Big Inch" transcontinental pipe line have

The FEC Unit

Closed End Type Optional

The Bearing

CJB AHLBERG BALL BEARINGS FOR EFFICIENCY

Flange units with CJB Ball Bearings are available for installations where conventional pillow blocks are not suitable.

Special features of these flange Units are:

—Full internal Self-Aligning Ball Bearing with Maximum number of balls, and Automatic Alignment.

—Compact, extra-heavy, well designed housing with large lubricant capacity.

—Labyrinth type seals—Frictionless, long wearing and exceptionally effective; Keep lubricant in and dirt out.

—Expansion or non-expansion type, optional at no extra cost.

—Closed end-cap optional and interchangeable on standard units.

—This FEC Series is available in shaft sizes from 3/4" x 2 3/16".

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been made and this completes one of the outstanding achievements of the tubular goods industry in producing and shipping the tremendous volume of large diameter tubing required for this line. The achievement is all the more remarkable considering the pressure being applied to the industry for delivery of tubular goods on other orders at the same time. Every outward indication points to the fact that line pipe business will be dull for a few months, with the exception of thin-wall tubing for temporary pipe lines on the battle fronts.

Some butt weld pipe is still available for July delivery, although in the past few days several sellers have moved into August. Lap weld may be had for late August and September shipment, with bessemer pipe in commercial sizes generally available in August. Seamless tubing producers are booked up many weeks ahead, especially on boiler and mechanical tubing, most cases, months ahead.

Southern pipe foundries are busy principally on war production, demand for cast iron pipe being particularly slack since completion of most of the government construction.

Wire . . .

Wire Prices, Page 151

On heavy tonnage products, welding wire, rope, signal wire and bullet core wire, steel mills are booked through the remainder of the year in most cases. The same applies to numerous specialties requiring four to eight weeks to process. Valve, gun and other types of spring wire are in strong demand. Few mills have any capacity open for early fourth quarter on these and more orders are appearing for delivery next year. Orders for aircraft wire are brisk and consumption is mounting, but reports are that some consumers in this field have accumulated rather large inventories.

Volume booked by wire mills in June was well in excess of shipments and with some specialty mills the tonnage was twice as large. On some wire items requiring no processing, demand for which is generally light, deliveries are possible in early August. Bright common basic wire is in this category with most mills. Supplies of rods are widely distributed, but integrated producers are regularly giving up tonnage, which limits their own finishing operations in some departments.

Rails, Cars . . .

Track Material Prices, Page 151

Several car inquiries are expected to be issued shortly. Car builders had looked for a flurry in inquiry late in June, but now it appears it will be postponed until the early part of this month and may not be as large as anticipated, as the idea was to get lists out so that steel and other raw material deliveries could be made in fourth quarter. Much further delay in getting orders placed and approved will make it impossible to get these raw material orders on the books before the end of this year.

Domestic freight car awards in June were nil for the second time this year, March being the previous month in which no orders were reported. No orders were placed in June a year ago, either.

	1943	1942	1941	1940
Jan.	7,415	4,253	15,169	360
Feb.	350	11,725	5,508	1,147
March	0	4,080	8,074	3,104
April	1,000	2,125	14,645	2,077
May	370	822	18,630	2,010
June	0	0	32,749	7,475
6 mos.	9,135	23,005	94,745	16,173
July	....	1,025	6,459	5,846
Aug.	....	0	2,668	7,525
Sept.	....	1,863	4,470	9,735
Oct.	....	0	2,499	12,195
Nov.	....	0	2,222	8,234
Dec.	....	135	8,406	7,181
Total	....	26,028	121,499	66,889

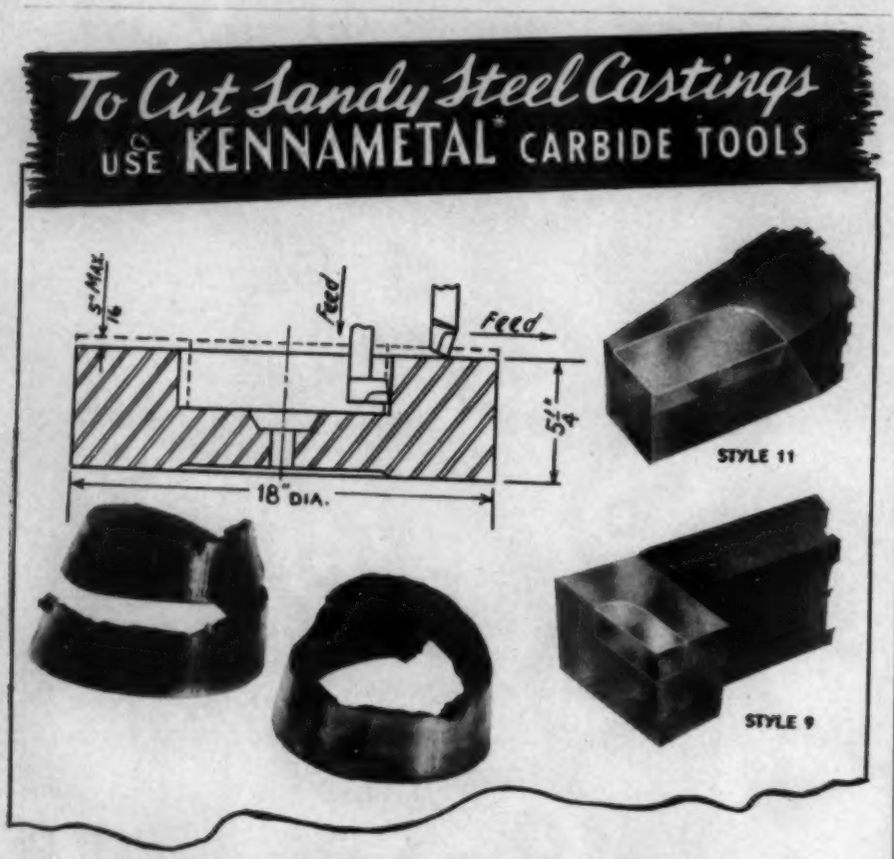
Domestic locomotive buying includes several orders during the past month, although nothing has been reported recently. Particular activity in locomotives has been for military and lend-lease accounts.

Structural Shapes . . .

Structural Shape Prices, Page 151

Leading sellers of structural shapes are out of the market until September on standard sections, due mainly to limitations of steel for that purpose. However, an increase in ship work is a factor in extending deliveries and in a moderate degree the same effect is the result of demand for tonnage for light locomotives for shipment abroad. As a result of shortage in steel castings structural and plate sections are being substituted for certain parts of locomotive assemblies. It is estimated the substituted structurals

To Cut Sandy Steel Castings USE KENNAMETAL* CARBIDE TOOLS



★ On this machining operation tool life was very limited because the exceptionally hard sandy castings caused excessive tool breakage. KENNAMETAL was installed—the following data proves again the superiority of KENNAMETAL'S performance even under adverse conditions.

KENNAMETAL Style 11 tool was employed for the turning and facing and tool Style 9 was used for the boring operation. Chips produced are illustrated actual size. The 18" casting was turned and faced at 148' per minute with a 5/16" depth of cut and a feed of .068". At this feed KENNAMETAL finished 3 castings before tools showed appreciable wear.

For information on the handling of KENNAMETAL tools for various operations, write for your copy of the KENNAMETAL tool manual.

KENNAMETAL THE All America CARBIDE

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Foreign Sales: U. S. STEEL EXPORT CO., 30 Church St., New York

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Will prove the answer to your hammer board problems. Hundreds of forge shops in the United States and her allies are using Irwin hammer boards made of straight grained Rock Maple, thoroughly seasoned and scientifically cut.

"Durock" and "Silverock" hammer boards will not be available for the duration.

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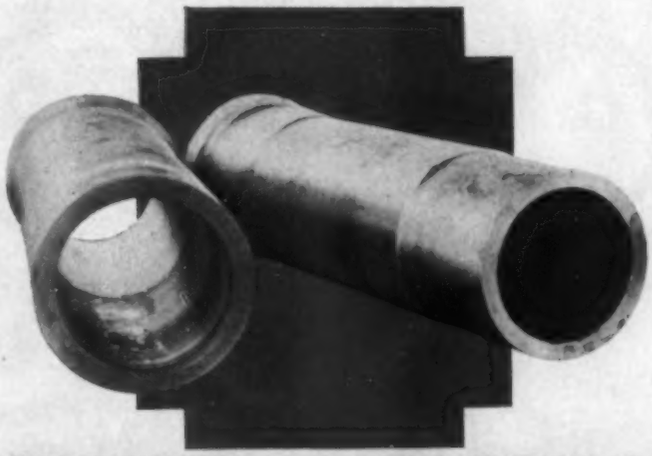

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Triple Reduction Continuous-Tooth Herringbone Gear Speed Reducer (with cover removed)

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MEET THE DEMANDS AND REQUIREMENTS OF INDUSTRY

Their great load carrying capacity, their very high efficiency and their continued proven performance indicates the engineering soundness of the design and manufacture of D. O. James Generated Continuous-Tooth Herringbone Reducers.

These units are the product of an organization with over a half-century of gear making experience and have a wide use in many different industries.

Catalogs are available containing complete engineering data, advantages, weights and prices.

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MANUFACTURING COMPANY
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MAKERS OF ALL TYPES OF GEARS AND GEAR REDUCERS

amount to about three tons per engine. Wide flange sections are not available before late August.

Bookings of fabricated steel, including buildings, bridges and sundry war products, during May totaled 28,338 net tons, according to the American Institute of Steel Construction, New York. This compares with 56,282 tons in April and 161,039 tons in May, 1942. Shipments in May were 86,491 tons, compared with 96,506 tons in April and 184,162 tons in May, 1942. Tonnage available for fabrication within the next four months totals 306,580 tons.

Pig Iron . . .

Pig Iron Prices, Page 152

It is impossible as yet to estimate the total pig iron loss due to the coal strike, although beyond question it was substantial. Fifteen blast furnaces in the Pittsburgh district were down for varying periods and a large number of additional stacks were running at reduced rates to conserve stocks of coke. The actual figures will probably not show up until the June tonnage totals are released officially. By the end of the week most blast furnaces had been returned to active status as the miners gradually returned to work and as beehive ovens came back into production. Demand for pig iron from steel melting plants was not backed up to a similar degree, inasmuch as a substantial part of the district steelmaking capacity was idle for lack of fuel. There is some lag, however, and the iron supply is now relatively lower than it was before the strike.

Slack in melt of foundry iron in the New England area is gradually spreading, the lag being more acute among jobbing shops and foundries supplying castings to the machine tool industry. While demand from shipbuilding yards is well above normal and increasing, this does not fill the gap caused by the slump at gray iron shops for other castings. Lifting of restrictions on production of replacements or new units for the textile and paper-making industries would quickly make for a recovery in demand for foundry grades as a heavy backlog for replacements is backing up in both textile and paper plants. Melt by steel works, malleable and steel foundries is maintained; at least one malleable shop is expanding capacity. The cast pipe foundry melt has subsided, substantially below normal.

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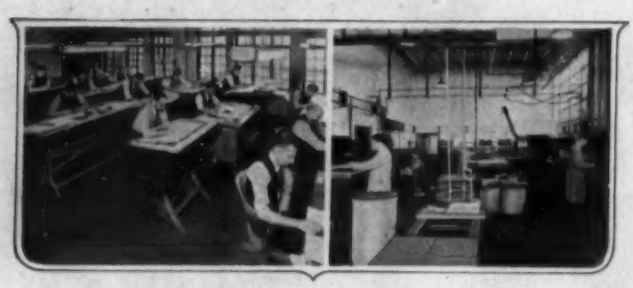

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Scrap . . .

Scrap Prices, Page 154

War Production Board is receiving protests from auto wreckers in connection with provisions of order M-311, which virtually freezes wrecking of cars, making it mandatory not to sell essential parts as scrap. In some parts of the country no autos are being wrecked, according to reports received in Washington.

Despite this bottleneck, a ready market for collections of scrap which have been difficult to move, will be assured by the plan recently released by the committee on scrap of the American Iron and Steel Institute, Paul C. Cabot, director, Salvage Division, War Production Board, says.

The plan provides machinery whereby every accumulation of prepared scrap, even in remote areas, will move promptly to consuming mills. This will enable scrap inventories to be built up during the seasons in which scrap can be most readily collected.

Scrap offerings in the Chicago district have fallen off about 20 per cent recently, causing some alarm. No consumer is endangered for the moment, but the trend may lead to disaster because this is the season when it is customary to lay down inventory for fall and winter months. Industrial material flows in fairly steady volume, but country scrap appears to be off considerably. This is judged to result principally from lack of manpower in collection and dealer organizations. In the interest of arresting the dangerous trend, Leigh B. Block, vice president, Inland Steel Co., the district's largest scrap purchaser, recently set out a letter to its sources of supply warning that a shortage may develop and urging increased efforts in collecting and shipping material to mills. He stated that Inland's inventories at present are slightly larger than a year ago, but he was not satisfied that another shortage will not develop.

Nonferrous Metals . . .

Nonferrous Prices, Page 156

New York—With requirements for copper and copper base alloys in the major war programs unabated interest centers in distribution of the metal; deliveries in July will fluctuate in volume as to individual consumers with scrap inventories a factor without much

Downs HANDLING EQUIPMENT

HORIZONTAL PLATE HOOKS may be used in sets of either two or four. Will handle one or more plates at each lift. They are time and labor savers for fast loading or unloading when plates are to be stacked in the flat position.

SAFETY PLATE GRIPS with either rigid or loose guide loops will hold with a positive grip in all positions. Used for handling vertical plates, they are also safe for upending or turning over horizontal plates or assemblies.

DOWNS RAIL TONGS built for safe and economical handling of railroad rails of all sizes and weights. Two-ton capacity with jaw openings of 3" for rails up to 100 lbs. ASCE. Three-ton capacity with jaw openings of 4½" for the heaviest rails.

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MADE TO SOLVE YOUR PROBLEMS

Call on Hubbard's long experience and skill in developing and manufacturing parts like these, to accomplish the results you are after in those various design and production problems.

Send in your drawings, or describe your problem. Your inquiry will bring real assistance and the advantages of long experience

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BIG-HED-NIBS
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● Three grades of diamonds. Common quality $12 per karat. Medium quality $24 per karat. Select quality $48 per karat. (Contour template diamonds supplied only in Medium and Select quality.) ¢ All diamond sizes ¼ to 10 karat are nib mounted for immediate shipment. . . Billed subject to approval. Specify quality of diamond wanted. *The Most Complete Line of Diamond Tools for War Production. Send for Free Catalog and Grinders' Instruction Card.*

RE-SET-ABLE
Cooler dressing
Closer Tolerances
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Because: Wing key heat dissipation and absolute diamond lock nib.

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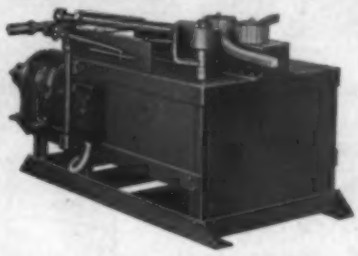
KARDONG CIRCLE BENDER

This is a powerful and fast machine for heavy duty work in both fabricating plants or in the field where large tonnage is required. It will handle as high as 20 tons a day. Circles of any size required in concrete reinforcing work from 18 inches in diameter up can be bent on this machine. It will bend bars with two or more radius on the same bar without stopping the machine.



Made in two sizes

Model "C" Capacity 1¼ inch
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Write for catalog of our complete line of reinforcing bar benders.

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SOLVE YOUR "SHORT RUN" DIE PROBLEMS

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It's an eye-opener on what you can do *without* dies, shows typical parts, and gives sizes and capacities of all models of Di-Acro Shears, Brakes, Benders.

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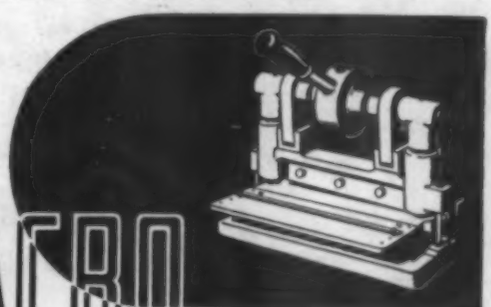


DI-ACRO PRECISION MACHINES

SHEAR (Illustrated) • BRAKES • BENDERS

O'NEIL-IRWIN MFG. CO. 304 EIGHTH AVE. SO. MINNEAPOLIS 15, MINN.

material change in the overall tonnage allocated.

Domestic production is all taken with foreign supplies contributing balance to the reserve stockpile. While pressure for new metal is somewhat easier in spots, due in part to arrivals of battlefield scrap, increasing labor shortages at mines is an unfavorable element, precluding much relaxation of restrictions on the use of copper. There have been a few minor revisions easing restrictions on use in radio building, but almost without exception new orders effecting copper are for further restrictions. Among them are further limitations on copper and copper-base alloy in the manufacture of U.S. insignia and an expanded list of building materials and fixtures.

The pinch for copper is increasingly felt by utilities. Allocations to this normally large consuming industry have been reduced sharply over a protracted period and utilities are hard put to maintain even repairs and necessary extensions.

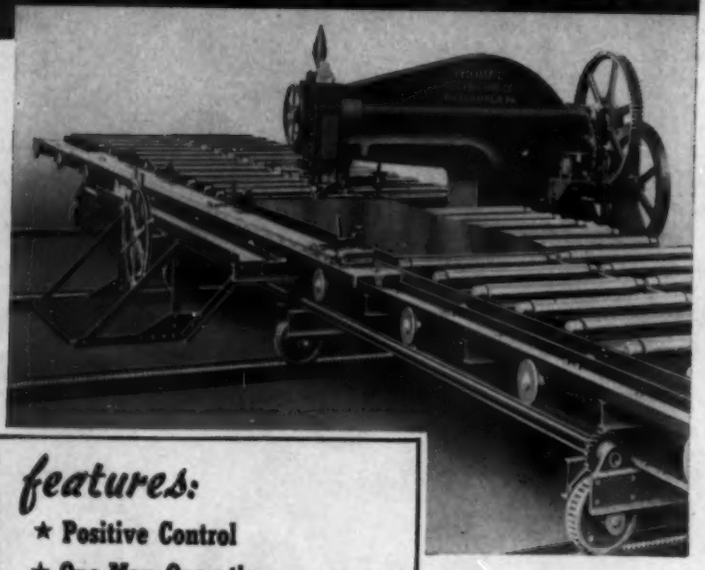
Recovery of idle or excess inventories of copper and copper-base alloys held by plumbers, building contractors and suppliers is the aim of a WPB program. If the material is reported by July 31, the Copper Recovery Corp. will pay for remelting or reprocessing material for war uses, 20.00c a pound for cast bronze and bronze pipe and tube fittings; 20.30c for wrought copper fittings. For fittings purchased for use in present forms, the government will pay 10 per cent more than the net price by the owner. Fittings will be used in their present forms where practicable, but if not, will be remelted. If not reported by July 31, material will be ordered sold as scrap at prevailing prices.

For a combination of reasons high grade zinc is easier while lower grades are tightening. Lend-Lease requirements for high grade are smaller and prime western makes up relatively more of exports. Allocations of lower grade for July are estimated as being in excess of production for that period. Contributing also to the easier position of high grade zinc is the receipt of more brass scrap, some of it battlefield material.

Inventory restrictions on lead have been removed to facilitate movement over heavily loaded transportation lines during the two months of lightest traffic. The WPB order thus allows lead to be moved from production and existing stockpiles to consumers in larger quantities. The transportation division, WPB, asked that wherever possible commodities be moved during July and August.

FABRICATING MACHINERY

THOMAS *High Precision*
Plate Punch and Table



features:
★ Positive Control
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Machine illustrated will handle plates up to 8 ft. wide, 30 ft. long

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This Thomas High-Precision Unit is featured by an ease of operation and positive control that make it a welcome time and money saver to busy war-time plants.

It is adapted to the punching of all kinds of plates . . ship, tank, boiler, car, etc. . . . with accuracy and speed!

Ask for our new Bulletin 125, describing the many advantages of this modern Thomas-designed machine.

THOMAS
MACHINE MANUFACTURING COMPANY
PITTSBURGH, PA.

Canada . . .

Toronto, Ont.—Curtailment in some branches of Canada's war production program has dropped the total war effort below the peak attained early this year. A number of companies are engaged in retooling for new lines of production and this will not be completed until the latter part of third quarter. In some other branches of war industry, however, production is speeding up, and steel demand is gaining in volume. According to mill representatives, the overall demand for steel is increasing, but most of the new business is for delivery in the latter part of the year, when new lines of production get under way.

Mills are maintaining backlogs at a good level and are not accepting firm commitments on new business beyond the end of the year. Little change is reported in plate demand. Buying continues on a large scale, but mainly for delivery late in the year. Some off-heat plate, not adaptable for war work, has been made available for civilian users and warehouse operators recently, and odd sizes also have been thrown on the market and taken by consumers not so particular regarding specifications. Some complaints have been made regarding price extras that are added for flame cutting, but the plate has been accepted despite the high price.

Demand for black and galvanized sheets continues brisk and backlogs are being maintained, despite some recent cancellations that have followed curtailment in certain war contracts.

Merchant bar sales are active and practically no cancellations of old orders have been reported in the past week or ten days. Shipbuilding and aircraft industries, as well as subcontractors for these types of war production, have been buying more extensively and have taken up any slack that has developed in other quarters. Implement makers also have been larger buyers of carbon bars recently.

Pig iron sales dropped last week to

FOR INTERCHANGEABLE MARKING USE . . .

The "Champion"
STEEL TYPE HOLDER

The "Champion" steel type holder (Patented) permits rapid interchangeable marking of flat, curved, concave or convex surfaces . . . assuring alignment and perfect spacing of characters. Pressure of thumb on spring actuated button releases type for instant changing. Holder shown is hand style. Also made with shank, for press production marking.

Construction

Quick Changing

"Champion" Holders and "Tuf-Face" type are furnished in partitioned wooden boxes as illustrated, for easy handling and for keeping type in place. Cross-sectional view shows simple, fool proof type changing mechanism. Write for information and prices.

JAS. H. MATTHEWS & CO.

3978 Forbes Street Pittsburgh, Pa.

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Cleveland Detroit Hartford Birmingham

WIRE

ROUND-FLAT-HALF ROUND
STRAIGHTENED AND CUT SHAPE WIRE

We are devoting our entire facilities to the War Program and will appreciate your inquiries for the following items:

HIGH CARBON SPRING
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AIRCRAFT—SIGNAL CORPS & ROPE WIRE
TINNED OR GALVANIZED

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ACETYLENE WELDING WIRE RODS AND COILS

WIRE FOR PRACTICALLY ALL PURPOSES AND REQUIREMENTS ALSO
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Representatives in practically all principal cities

CUT GEARS

All Types and Sizes

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Heat Treated Alloy Steel Gears to Customer's Specifications

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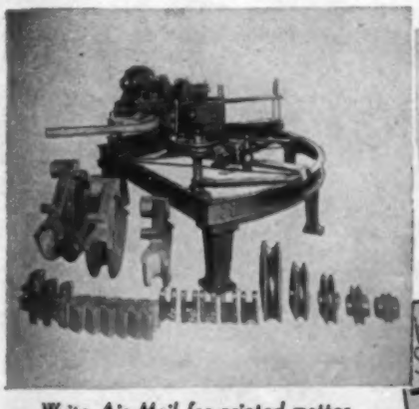
2680-2700 Smallman Sts., Pittsburgh, Pa.

THE SIMONDS GEAR & MFG. CO.
25TH STREET, PITTSBURGH, PA.

To all gear users:

1942 marks our 50th year in the gear business; this means that our quality gears are now backed by half a century of experience in the manufacture of all types of dependable gears—spur, bevel, miter, worm, rack, internal etc. If we haven't just the type you need, we can make it—and in a hurry, too!



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"American"
COLD PIPE, CONDUIT and TUBE BENDING MACHINES

Twelve types to select from. **Hand operated capacities ⅛ to 6" inclusive. Motor operated ¾ to 8" inclusive.**

A few of our More Than 12,000 Customers: **Bureau of Ships, Wash., D. C.; Henry J. Kaiser Co., Calif.; Pacific Bridge Co.; Bethlehem-Hingham Shipyards; Hercules Powder Co.; Stone & Webster Engineering Corp.; E. I. Du Pont de Nemours & Co.**

"American"
PIPE BENDING MACHINE Company INC
17 PEARL ST.
BOSTON, MASS.

less than 4000 tons. Dullness in the pig iron markets is credited to the fact that most melters have enough iron on hand for current needs, and some are supplied for 60 to 90 days. Most current demand is for malleable iron.

Little change is reported in scrap iron and steel markets. Receipts are slightly ahead of consumers' requirements, with some betterment in deliveries from outside points.

Steel in Europe . . .

London—(*By Radio*)—Steelmakers in Great Britain are experiencing heavy demand for steel plates for shipbuilding and armaments. Increasing pressure is being exerted on producers for special steels and alloys. The market for tin plate is quiet. Pig iron supply has become adequate for general needs.

Industry Aware of Need For Postwar Planning

(*Concluded from Page 76*)

and five men familiar with company policy and procedures. This group does research work, draws up plans and provides pertinent information to proper individuals. Accumulated data are sifted once each month by a steering committee of five department heads of which the director of production research is chairman. Conclusions and condensed material are passed on to management for consideration.

This company actually has short term and long term programs. The first is predicated on the sudden termination of the war and covers emergency measures. The second is a continuation and expansion of the short term plan. Problems studied include cancellation of contracts, reconversion of plant facilities, labor, new products, competition, domestic and foreign markets.

In all of the studies made so far, these facts are clear:

Practically every company is doing postwar planning even if it goes no farther than discussions around the luncheon table. Most companies expect to produce new but not radically new products designed to increase output and cut costs. Some switches in markets will be made, either within the industrial field or from industrial to consumer goods.

Few expect to maintain employment at present levels.

Government plants will not be retained unless made available at low cost. Some don't want the plants at any figure.

The materials "bugaboo" is being overplayed. New materials will find their spot and most familiar ones will not be jockeyed out of position. Some producers of materials like plastics fear they will be misapplied and subsequently fail to find applications where they could very well be used.

Some planning is not postwar at all, although it will have a strong influence later. It might better be termed "progress".

BASIC OPEN-HEARTHS
THRIVE BEST ON . . .
NO. 34-30 MEXICAN GRAPHITE

• What you get out of anything depends largely upon just what you put into it—and that adage smacks truer for open-hearth practice than any other phase of steel production. The quality of your pig-iron, scrap and the various purifying and carburizing agents employed — mean the difference between good and fair steel.

No. 34-30 Mexican Graphite is a *superior* carburizer for basic open-hearth charges. Used under the lime, it feeds carbon steadily into the metal—provides a good boil that helps to release lime and clean up the hearth quickly. No foaming or gassy reactions will mar an otherwise perfect heat. . . . May we mail you more detailed information on this especially sized and processed Graphite product?

THE UNITED STATES GRAPHITE CO.
SAGINAW, MICHIGAN
U. S. A.

STRUCTURAL SHAPES . . .

SHAPE CONTRACTS PLACED

6380 tons, Colorado river bridge, Topock, Ariz., for Atchison, Topeka & Santa Fe railroad, to American Bridge Co., Pittsburgh; bids May 8.

1480 tons, ore docks, Escanaba, Mich., 1253 tons for chutes to American Bridge Co., Pittsburgh, and 227 tons for doors, track scales and miscellaneous parts to unstated fabricators; Merritt, Chapman & Scott, contractors; bids May 7.

1332 tons, static testing laboratory, Wright Field, Dayton, O., for Army Air Corps, to American Bridge Co., Pittsburgh; F. K. Vaughn Construction Co., contractor.

SHAPE CONTRACTS PENDING

5600 tons, 18 floating piers design 380, various locations, Thompson Pipe & Steel Co., Denver, contractor.

REINFORCING BARS . . .

REINFORCING STEEL PLACED

325 tons, grain elevator, Spencer-Kellogg Co., Decatur, Ill., to Laclede Steel Co., St. Louis; James Stewart Corp., Chicago, contractor; bids June 28.

REINFORCING STEEL PENDING

237 tons, new unit, Edward Hines Jr. Veterans hospital, Chicago, for U. S. Veterans Administration; J. Emil Anderson & Son, Chicago, low on general contract; bids June 29.

130 tons, passenger station, Chicago, Burlington & Quincy railroad, Burlington, Iowa; Holabird & Root, Chicago, architects; bids May 23.

PIPE . . .

CAST PIPE PENDING

100 tons, mostly 12-inch, cement-lined, Panama, sch. 6992; bids July 6.

S. A. COCHRAN, *President* — E. A. SAMUEL, *Vice-Pres.* — W. F. KRIEGER, *Sec.-Treas.*

FRANK SAMUEL & CO., Inc.

Harrison Bldg., Philadelphia, Pa.

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Ferro-Chrome—Calcium Silicide
Ferro Silicon—Silico Manganese

PIG IRON

FERRO MANGANESE
Standard—Low Carbon

MANGANESE ORE
Open Hearth Use—Blast Furnace Use

IRON ORES

CHROME ORE
Lump—Ground

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West Newton, Mass.—28 Fairway Drive
New York—40 Exchange Place

SMITH MASTER SURFACE PLATES

On specifications requiring a total flatness tolerance of one ten-thousandths of an inch, medium size Smith Master Surface Plates have successfully met the test to the entire satisfaction of hard-to-please users.

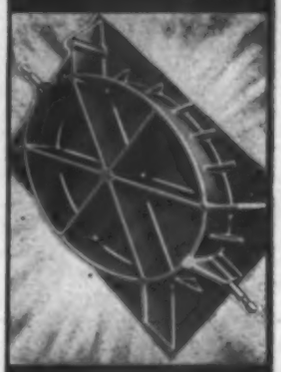
Precisely... RIGHT

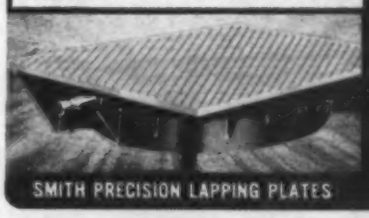
Present day inspection and assembly demands surface plates of utmost precision accuracy. Plants engaged in aircraft and ordnance production throughout the country have come to depend on Smith Plates. Their complete satisfaction is evidenced by frequent reorders. If your requirements call for precision accuracy, wire, phone or write.

SMITH TOOL & ENGINEERING CO.
857 North Sandusky St., Bucyrus, Ohio

Available Sizes

8" x 12"	18" x 18"	20" x 30"	30" x 60"
9" x 14"	18" x 24"	24" x 36"	36" x 68"
12" x 18"	24" x 24"	30" x 36"	48" x 96"





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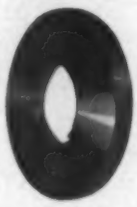

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CONSTRUCTION AND ENTERPRISE

OHIO

BARBERTON, O.—Babcock & Wilcox Co. plans installation of a 48 x 48 economizer costing $3500 and repairs to machine shop on Sterling avenue, to cost about $4300.

CLEVELAND—International Metal Hose Co., William H. Miller, president, 10709 Quincy avenue, will build new storage plant, 22 x 63 feet.

CLEVELAND—Art in Bronze Co., O. H. Harer, president and general manager, 1621 East Forty-first street, suffered $12,000 loss in burning of its smelter building.

CLEVELAND—Paul Klamm, 1790 East Sixty-eighth street, awaits zoning board approval to convert gas station at East Sixty-sixth street and Hough avenue into light machine shop.

CLEVELAND—Standard Oil Co. of Ohio, H. West, Midland building, has let contract for two steel plate gas holders to Hammond Iron Works, Hammond, Ind. Estimated cost about $40,000.

CLEVELAND—Kando Metal Products Co., has been formed to manufacture metal products by Hazel Winter, Charles A. Hyde and M. S. Farmer. The latter is statutory agent, 602 Engineers building, Cleveland.

CLEVELAND—Dolor-Meter Inc. has been incorporated by Morton C. Mandell and associates to engage in scientific research and manufacture the Dolor meter. Incorporation was handled by Elsie Scherer, 925 Rose building.

CLEVELAND—Lakeside Steel Improvement Co., C. W. Derhammer, president and general manager, 5418 Lakeside avenue, will build steel runway for five-ton crane, 50 x 200 feet and 35 x 100-foot shelter house, to cost about $10,000.

CLEVELAND—Browning Crane & Shovel Co., Sheldon Cary, president, 16226 Waterloo road, is adding a two-story 50 x 200-foot warehouse; 50 x 100-foot machine shop and crane runway, using old crane; one-story 35 x 62-foot processing building and 15 x 40-foot service and locker building.

ELYRIA, O.—Elyria Machine Products Co. has been incorporated for manufacturing purposes by James L. Wamsley, 115 Cedar street, and associates.

LISBON, O.—Chester Mfg. Co., Hal Wright, president, will build a one-story office and factory building 50 x 260 feet to increase facilities for war subcontracting which is engaging all its present facilities.

MASSACHUSETTS

BEVERLY, MASS.—Owner, care Beverly Chamber of Commerce, 242 Cabot street, plans construction of a 500-unit capacity frozen food storage plant, to cost about $40,000.

NEW YORK

JAMESTOWN, N. Y.—Crescent Tool Co. has let contract for a three-story plant addition on Harrison street to L. Ludwig, 20 West Main street, Falconer, N. Y. Cost is estimated at $100,000. Beck & Tinkham, Bailey building, are architects. (Noted June 7.)

NEW JERSEY

HILLSIDE, N. J.—Cooper Alloy Foundry Co., Bloy street, has let contract for a 1½-story plant addition, 50 x 75 x 240 feet, to Clifford Scheer, 540 North avenue, Union, N. J., at about $40,000. Walter Pfieffer, 681 Newark avenue, Elizabeth, N. J., is architect.

MICHIGAN

DETROIT—Continental Motors Corp., 12801 East Jefferson avenue, is having plans made for a one-story plant, 130 x 270 feet. Russell Engineering Co., 607 Shelby street, is engineer.

ILLINOIS

CICERO, ILL.—American Phenolic Corp. is having plans prepared for a factory building with about 250,000 square feet floor space. Burnham & Hammond, 160 North LaSalle street, Chicago, are architects.

MARYLAND

BALTIMORE—Edgar H. Smith, Linganore avenue, Hamilton, Md., is building an addition to his machine shop to increase capacity for war orders.

BALTIMORE—Bartlett Hayward division, Koppers Co., 200 Scott street, is erecting a propeller testing laboratory in connection with its airplane propeller department. Company is manufacturing propellers under arrangement with Everal Propeller Corp., involving new features.

BALTIMORE—Delta Chemical Mfg. Co., 2101 Washington boulevard, is building a one-story plant containing 5000 square feet, for manufacture of chemicals. Normally producing sodium hypochlorite and laundry supplies, the company is now almost exclusively on government work.

BALTIMORE—Maryland Engineering Co., with offices at 2103 North Charles street and plant at 1401 Reisterstown road, Pikesville, maker of portable radio towers, radio cabinet cases, etc., has leased property at 1326 Reisterstown road and is equipping it as a branch plant. Two buildings have been equipped as machine shops and a third will be ready soon.

NORTH CAROLINA

GREENSBORO, N. C.—General Foundry & Machine Co., A. R. Miles, manager, will

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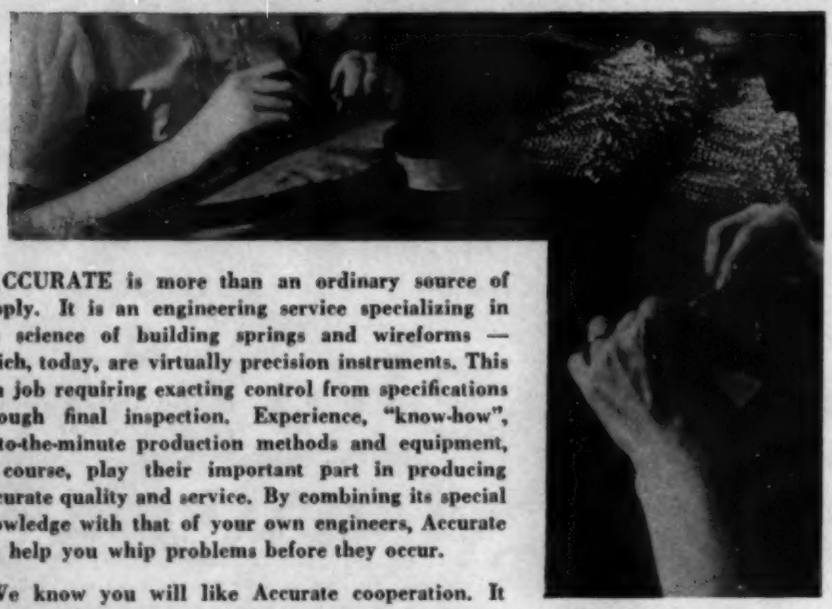

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SOUTH CAROLINA

HOLLY HILL, S. C.—Defense Plant Corp., Samuel Husbands, president, Washington, has let contract to Charles E. Daniel Construction Co., Poinsett Hotel building, Greenville, S. C., at $2,750,000 for an aluminum plant near Harleyville, S. C., in Dorchester county.

ROCK HILL, S. C.—Southeastern Construction Co., 218 West Second street, Charlotte, N. C., is building a cold storage locker plant for Electric Co-Operative Refrigeration Co., 54 x 71 feet, 250 individual lockers, to cost $32,800. W. B. Wilkerson, Hickory Grove, S. C., is president of the co-operative.

MISSOURI

ST. LOUIS—Scullin Steel Co., 6700 Manchester avenue, will let contracts soon for a three-story office building 50 x 150 feet. Paul Duelli & Schmidt, 1623 Arcade building, are architects.

WISCONSIN

MILWAUKEE—Stolper Steel Products Co., 3258 North Fond du Lac avenue, has bought a tract adjoining its plant for expansion. Land contains an office building and a three-story manufacturing plant, with 45,000 square feet floor space.

MILWAUKEE—United States Steel Supply Co., subsidiary of United States Steel Corp., has bought physical assets of Moise Steel Co. and will continue the steel warehouse business of the latter. Carl Gallauer, formerly vice president of the Moise company, has been appointed district manager.

OSHKOSH, WIS.—Oshkosh Motor Truck Inc., manufacturer of four-wheel-drive trucks, has applied to WPB for permission to build a one-story plant addition 100 x 100 feet.

WISCONSIN RAPIDS, WIS.—Frentiss-Wabers Mfg. Co. is building a one-story addition to its plating room.

MINNESOTA

MINNEAPOLIS—Advance Brass & Aluminum Foundry, Malcolm avenue Southeast, plans construction of a one-story foundry addition.

MINNEAPOLIS—Minneapolis Street Railway Co. has let contract to C. O. Field, 720 South Sixth street, for a one-story addition to a substation at Twenty-seventh avenue South and Twenty-ninth street.

ST. PAUL—St. Paul Engineering & Mfg. Co., formerly St. Paul Foundry Co., has let contract to William Baumeister Construction Co. for alterations and improvements to its plant.

ST. PAUL—Brown & Bigelow, manufacturers of advertising specialties and war products, is making improvements and installing additional equipment in its power plant, including a 400-kw. steam engine generator, new motors and other equipment. Albert C. Johnson is the company's chief engineer.

WINDOM, MINN.—Mooers Welding & Machine Shop, William Mooers, proprietor manufacturer of hammer mills and simila. products, has applied to WPB for permission to build a one-story addition to increase plant facilities.

TEXAS

BEAUMONT, TEX.—Samuelson Shipbuilding Co., Beaumont, has received a contract for 17 allsteel oil barges on Harbor Island, opposite city docks, to cost about $500,000.

JASPER, TEX.—Jasper-Newton Electric Cooperative Inc., E. T. Ahlman, president, has been allotted $185,000 by REA for generating plant and distribution system in Jasper and Newton counties.

SAN ANTONIO, TEX.—E. W. Staph, supervising engineer, 514 Alamo National building, San Antonio, has let a contract for the United States government to Cunningham & Dinn, 2024 North St. Marys street, at $16,500 for construction of filter beds, imhoff tanks, etc., at air schools at Ballinger and Brady, Tex.

STAMFORD, TEX.—Defense Plant Corp., 301 Cotton Exchange building, Dallas, Tex., has let contract for a sewage disposal plant to Dolph Construction Co., Thomas building, Dallas, Tex., at approximately $37,500. Koch & Fowler, Great National Life building, Dallas, are engineers.

NEBRASKA

BEATRICE, NEBR.—Beatrice Steel Tank Mfg. Co., manufacturer of tanks and sheet metal products, has let contract to Frank Robertson for a one-story factory building.

IOWA

CEDAR RAPIDS, IOWA—Universal Engineering Corp., manufacturer of rock crushing machinery and similar equipment, will build a one-story plant addition.

DAVENPORT, IOWA—Davenport Besler Corp., builder of locomotives, snow plows, etc., has let contract to Priester Construction Co. for a one-story addition to its machine shop.

CALIFORNIA

LOS ANGELES—Chambers Tool & Die Co. has been formed by Douglas R. Chambers and will be established at 6409 Avalon boulevard.

LOS ANGELES—Stroud Machine & Mfg. Co. has been organized by Mark L. Stroud and will operate a plant at 5908 Hollywood boulevard.

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RIVERSIDE, CALIF.—Food Machinery Corp. has given a contract for a warehouse and storage building, 70 x 560 feet, to cost $50,000.

SACRAMENTO, CALIF.—A new shipyard for outfitting light-draft naval escort vessels will be established on the Sacramento waterfront, following federal approval of a contract between Industries Construction Co. and Kaiser Cargo Inc. Vessels to be outfitted will be launched at the Kaiser No. 4 yard and towed to Sacramento for installation of machinery and other facilities. About 2000 persons will be employed.

SOUTH GATE, CALIF.—Pacific Screw Products Co., 5211 Southern avenue, has obtained building permit for a plant addition costing $7500.

VAN NUYS, CALIF.—Precision Products Corp., 10777 Van Owen street, has awarded a contract for construction of two factory buildings, 167 x 262 feet and 42 x 122 feet, costing $97,000.

WILMINGTON, CALIF.—May Tool Co. has been organized by Frank May, Fred Hust and Walter Combes, and will establish a business at 1010 Alameda Boulevard.

WILMINGTON, CALIF.—A one-story top addition to the office building of the shipbuilding division of the Western Pipe & Steel Co., Berth 129, Wilmington. It will cover 40 x 250 feet.

YREKA, CALIF.—Lava Cap Gold Mining Corp. has leased 1200 acres containing manganese deposits and will build a manganese concentrating plant to process to about 42 per cent manganese. Mining equipment will be installed.

CANADA

FORT WILLIAM, ONT.—Canadian Car & Foundry Co. Ltd., 621 Craig street west, Montreal, has given general contract to Claydon Co. Ltd., Victory block, for construction of plant addition here, 60 x 400 feet, to cost $30,000. L. J. Soulsby is local manager.

GALT, ONT.—Whitehall Machinery & Tools Ltd., Beverly street, has given general contract to Thomas Construction Co. Ltd., 45 Dickson street, for construction of plant addition, 50 x 80 feet, to cost, with equipment, about $25,000.

TORONTO, ONT.—Canadian General Electric Co. Ltd., 212 King street West, has given general contract to Pigott Construction Co. Ltd., Pigott building, Hamilton, Ont., for construction of addition to the Edison Lamp Works, 189 Dufferin street, to cost with equipment, $240,000. Beck & Eadie, 220 Bloor street West, architects.

TORONTO, ONT.—Toronto Shipbuilding Co. Ltd., Fleet street West, in association with Department of Munitions and Supply, Ottawa, is having plans prepared by its own staff for construction of addition to plant No. 100, to cost about $35,000. Gordon C. Leitch is president.

WELLAND, ONT.—Page-Hersey Tubes Ltd., 100 Church street, Toronto, Ont., has given general contract to Dickie Construction Co. Ltd., 17 York street, Toronto, for further addition to its plant here to cost about $22,000. Margison & Babcock, 210 Dundas street, West, Toronto, are consulting engineers.

WINDSOR, ONT.—Chrysler Corp. of Canada Ltd., 300 Tecumseh boulevard, has given general contract to Dinsmore-McIntyre Ltd., 903 Security Building, for construction of new plant addition here to cost about $50,000.

BATHURST, N. B.—Northern Machine Works, Main street, plans to start work soon on construction of machine shop here to cost, with equipment, about $28,000.

ARVIDA, QUE.—Abrasive Co. of Canada Ltd., plans to start work soon on construction of addition to furnace building here, estimated to cost about $50,000 with equipment.

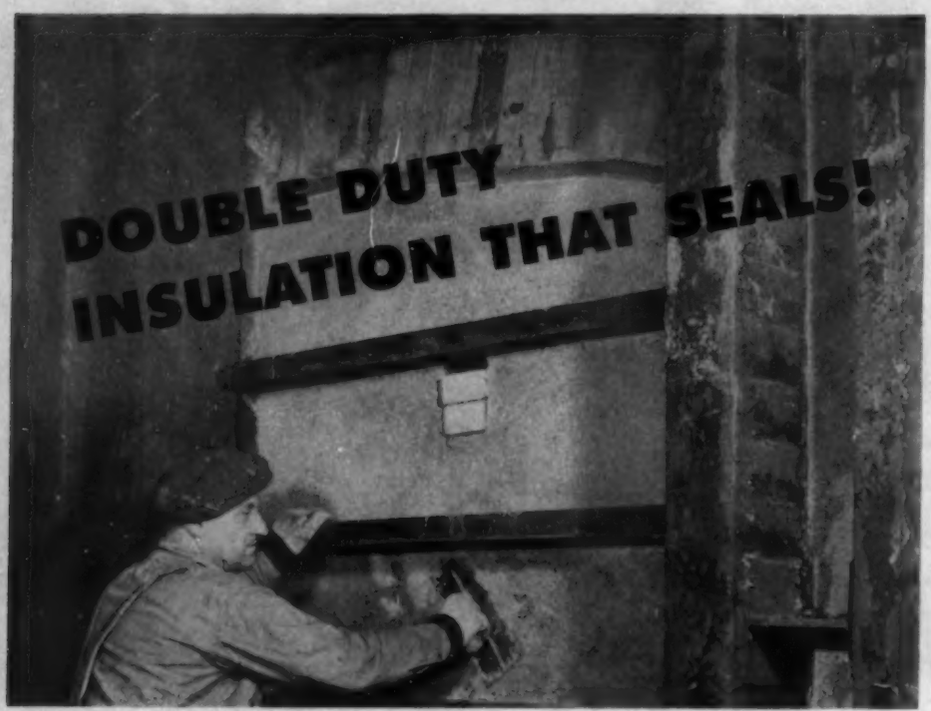
BROWNSBURG, QUE. — J. D. Lepine is completing arrangements for rebuilding sawmill, and sash and door factory here to replace factory recently destroyed by fire. Estimated cost, with equipment, $25,000.

DRUMMONDVILLE, QUE.—Canadian Celanese Ltd., in association with the Department of Munitions and Supply, Ottawa, is having plans prepared by J. L. Killoran, chief engineer, P. J. Wright, purchasing agent, members of its own staff, for construction of a plastic plant here to cost, with equipment, about $5,000,000. Contracts will be awarded soon. R. H. Sperling is plant manager.

MONTREAL, QUE.—Canadian Car & Foundry Co. Ltd., 621 Craig street West, is having plans prepared by Spence & Burge, architects, 2063 Union avenue, and contracts will be let soon for further addition to the company's Turcot works, to cost about $105,000.

MONTREAL, QUE.—Canadian Pacific Railway Co. has received tenders through W. P. Harper, divisional engineer, Park avenue station, and contracts will be awarded without delay for construction of addition to machine shop and extension to dope house at the Hochelaga yards, estimated to cost, with equipment, about $100,000.

MONTREAL, QUE.—A company whose name is withheld, in association with the Department of Munitions and Supply, Ottawa, has given contract to Carter-Halls-Aldinger Co. Ltd., 419 Cherry street, Toronto, for construction of new castings shop here, to cost $350,000, and work is proceeding. The same contractor also will make general alterations to old castings shop.



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section
of
STEEL
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SECTION TWO
JULY 5, 1943
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Alloy Metal Abrasive Co., 311 W. Huron St., Ann Arbor, Mich.
American Foundry Equipment Co., The, 509 S. Byrkit St., Mishawaka, Ind.
Carborundum Co., The, Niagara Falls, N. Y.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., 4839 Harrison St., Pittsburgh, Pa.

ABRASIVES (Coated Paper & Cloth)

Abrasive Products Inc., S. Braintree, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul, Minn.

ABRASIVES (Polishing)

Abrasive Co., Tacony & Fraley Sts., Philadelphia, Pa.
Carborundum Co., The, Niagara Falls, N. Y.
Chicago Wheel & Manufacturing Co., Dept. ST-7, 1101 W. Monroe St., Chicago, Ill.
Norton Co., Worcester, Mass.

ACCUMULATORS

Aldrich Pump Co., 2 Gordon St., Allentown, Pa.
Babcock & Wilcox Co., The, 85 Liberty St., New York City.
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Farquhar, A. B., Co., Ltd., 195 Duke St., York, Pa.
Hydropress, Inc., 370 Lexington Ave., New York City.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Taylor-Wilson Mfg. Co., 1200 Thomson Ave., McKees Rocks, Pa.
Watson-Stillman Co., Roselle, N. J.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

ACETYLENE

Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.

ACID-PROOF LININGS

Cellcote Co., 750 Rockefeller Bldg., Cleveland, O.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.
Heil Engineering Co., 12903 Elmwood Ave., Cleveland, O.
National Carbon Co., W. 117th St. & Madison Ave., Cleveland, O.
National Lead Co., 111 Broadway, New York City
Pennsylvania Salt Mfg. Co., Widener Bldg., Philadelphia, Pa.
United States Rubber Co., Mechanical Goods Div., 1230 Sixth Ave., New York City.

AEROCASING

Lakeside Steel Improvement Co., The, 5418 Lakeside Ave., Cleveland, O.

AGITATORS

Porter, H. K., Co., 49th & Harrison Sts., Pittsburgh, Pa.

AIR CONDITIONING EQUIPMENT

American Air Filter Co., 443 Central Ave., Louisville, Ky.
Buffalo Forge Co., 158 Mortimer St., Buffalo, N. Y.
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.
General Electric Co. (Air Conditioning & Commercial Refrigeration Dept., Div. 437.) Bloomfield, N. J.
Graybar Electric Co., 420 Lexington Ave., New York City
Salem Engineering Co., Air Conditioning and Refrigeration Div., 714 S. Broadway, Salem, O.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Weatherhead Co., The, 300 E. 131st St., Cleveland, O.
Westinghouse Electric & Mfg. Co., 653 Page Blvd., Springfield, Mass.
Worthington Pump & Machinery Corp., Harrison, N. J.

AIRCRAFT ACCESSORIES, PARTS, SUPPLIES

American Brake Shoe Co., Kellogg Div., 97 Humboldt St., Rochester, N. Y.
Andrews Steel Co., The, Newport, Ky.
Cleveland Pneumatic Tool Co., 3781 E. 77th St., Cleveland, O.
Denison Engineering Co., The, 1163 Dublin Rd., Columbus, O.
Elastic Stop Nut Corp., 2340A Vauxhall Rd., Union, N. J.
Fidelity Machine Company, 3908-18 Frankford Ave., Philadelphia, Pa.
Garrett, George K., Co., D & Tioga Sts., Philadelphia, Pa.
General Electric Co., Sec. A 333-90 Appliance & Merchandising Dept., Bridgeport, Conn.
Kropp Forge Co., 5301 W. Roosevelt Rd., Chicago, Ill.
Mueller Brass Co., Port Huron, Mich.
Spriesch Tool & Mfg. Co., 22 Howard St., Buffalo, N. Y.
Steel and Tubes Div. Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Steel Improvement & Forge Co., 950 E. 64th St., Cleveland, O.
Weatherhead Co., The, 300 E. 131st St., Cleveland, O.

AIRLESS BLAST CLEANING EQUIPMENT

American Foundry Equipment Co., The, 509 S. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.

ALLOY METALS (Nonferrous)—See METALS (Nonferrous)

ALLOY STEELS (Heat Resistant)

American Brake Shoe Co., American Manganese Steel Div., 389 E. 14th St., Chicago, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., Reading, Pa
International Nickel Co., Inc., The, 67 Wall St., New York City
Michiana Products Corp., Michigan City, Ind.
Midvale Co., The, Nicetown, Philadelphia, Pa.

ALLOYS (Ferroalloys)—See FERROALLOYS

ALLOYS (Heat Resistant)

Carpenter Steel Co., 139 Bern St., Reading, Pa.
International Nickel Co., The, 67 Wall St., New York City.

ALLOYS (Magnesium)

Bohn Aluminum & Brass Corp., Lafayette Bldg., Detroit, Mich.
Dow Chemical Co., The, Midland, Mich.

ALLOYS (Nonferrous)

Ajax Metal Co., Philadelphia, Pa.
American Brass Co., The, 25 Broadway, New York City.
Bohn Aluminum & Brass Corp., Lafayette Bldg., Detroit, Mich.
International Nickel Co., Inc., The, 67 Wall St., New York City
Mallory & Co., P. R., 3029 E. Washington Ave., Indianapolis, Ind.
Western Cartridge Co., Brass Mill Div., East Alton, Ill.

ALUMINUM (Screw Stock)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.

ALUMINUM AND ALUMINUM ALLOYS

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
Bohn Aluminum & Brass Corp., Lafayette Bldg., Detroit, Mich.

ANGLES—See BEAMS, CHANNELS, ANGLES

ANNEALING (Tempering)

Lakeside Steel Improvement Co., The, 5418 Lakeside Ave., Cleveland, O.
Lepel High Frequency Laboratories, Inc., 39 W. 60th St., New York City

ANNEALING BOXES

American Brake Shoe Co., Brake Shoe & Castings Div., 230 Park Ave., New York City.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co E. Chicago, Ind.
Mesta Machine Co., P. O., Box 1466, Pittsburgh, Pa.
Union Steel Casting Div. of Blaw-Knox Co., 62nd & Butler Sts., Pittsburgh, Pa.
United Engineering & Foundry Co., First National Bank Bldg., Pittsburgh, Pa.
Wean Engineering Co., Inc., The, Warren, O.
Wilson, Lee, Engineering Co., 20005 Lake Rd., Cleveland, O.

ANNEALING COVERS

Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Wean Engineering Co., Inc., The, Warren, O.

ANODES (All Types)

American Brass Co., The, 25 Broadway, New York City.
Revere Copper & Brass Co., Inc., 230 Park Ave., New York City
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

ANODES (Lead & Lead Alloy)

National Lead Co., 111 Broadway, New York City

ANODES (Nickel)

Seymour Manufacturing Co., The, Seymour, Conn.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

ANTIMONY

St. Joseph Lead Co., 250 Park Ave., New York City.

ANTISEPTIC CREAM

Tarbonis, Co., 1220 Huron Rd., Cleveland, O.

AXLES

American Brake Shoe Co., American Forge Div., 332 S. Michigan Ave., Chicago, Ill.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

BABBITT METAL

Ajax Metal Co., Philadelphia, Pa.
Bohn Aluminum & Brass Corp., Lafayette Bldg., Detroit, Mich.
Cadman, A. W., Mfg. Co., 28th & Smallman St., Pittsburgh, Pa.
National Bearing Metals Corp., 4930 Manchester Ave., St. Louis, Mo.
National Lead Co., 111 Broadway, New York City
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.

BADGES AND BUTTONS

St. Louis Button Co., 413-415 Lucas Ave., St. Louis, Mo.

BALANCING MACHINES

Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.

BALING PRESSES

Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Galland-Henning Manufacturing Co., 2747 S. 31st St., Milwaukee, Wis.
Hydraulic Press Mfg. Co., Mt. Gilead, O.

BALL TRANSFERS

Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

BALLS (Brass or Bronze)

Atlas Ball Div. SKF Industries, Inc., Philadelphia, Pa.
Strom Steel Ball Co., 1850 S. 54th Ave., Cicero, Ill.

BALLS (Grinding)

Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.

BALLS (Special Alloy Metals)

Atlas Ball Div. SKF Industries, Inc., Philadelphia, Pa.

BALLS (Steel) (*Also Stainless)

*Atlas Ball Div. SKF Industries, Inc., Philadelphia, Pa.
*Strom Steel Ball Co., 1850 S. 54th Ave., Cicero, Ill.

BANDS AND HOOPS (Iron and Steel)

Acme Steel Co., 2826 Archer Ave., Chicago, Ill.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Calcos Steel & Iron Co., 1332 North 30th St., Philadelphia, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Smith, David, Steel Co., Inc., 234—46th St., Brooklyn, N. Y.
Stanley Works, The, New Britain & Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

BARGE MOVERS

Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

BARGES (Steel)

American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Dravo Corp. (Engin'r'g Works Div.) Neville Island, Pittsburgh, Pa.
Federal Shipbuilding & Dry Dock Co., Kearny, N. J.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Maryland Dry Dock Co., Baltimore, Md.

BARGES (Wood)

Koppers Co., Wood Preserving Div., 300 Koppers Bldg., Pittsburgh, Pa.

BARRELS (Plating)

Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

BARRELS (Steel)

Pressed Steel Tank Co., 1461 S. 66th St., Milwaukee, Wis.

BARRELS (Tumbling)

Ransohoff, N., Inc., 1317 Township Ave., Cincinnati, O.

BARS (Alloy Steel)

Allegheny Ludlum Steel Corp., Dept. S-3, Brackenridge, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Ampco Metal, Inc., Dept. S-7, 3830 W. Burnham St., Milwaukee, Wis.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., 139 Bern St., Reading, Pa.
Columbia Steel Co., San Francisco, Calif.
Copperweld Steel Co., Warren, O.
Firth-Sterling Steel Co., McKeesport, Pa.
International Nickel Co. Inc., The, 67 Wall Street, New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.

BARS (Alloy Steel)—Cont.

Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Smith, David, Steel Co., Inc., 234—46th St., Brooklyn, N. Y.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Wyckoff Drawn Steel Co., 1st National Bank Bldg., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BARS (Aluminum or Magnesium)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
Bohn Aluminum & Brass Corp., Lafayette Bldg., Detroit, Mich.
Dow Chemical Co., The, Midland, Mich.

BARS (Brass, Bronze or Copper)

American Brass Co., The, 25 Broadway, New York City.
Bohn Aluminum & Brass Corp., Lafayette Bldg., Detroit, Mich.
Bridgeport Brass Co., Bridgeport, Conn.
Copperweld Steel Co., Warren, O.
Johnson Bronze Co., 550 S. Mill St., New Castle, Pa.
Mueller Brass Co., Port Huron, Mich.
National Bearing Metals Corp., 4930 Manchester Ave., St. Louis, Mo.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Shenango-Penn Mold Co., 412 W. Third St., Dover, O.
Western Cartridge Co., Brass Mill Div., East Alton, Ill.

BARS (Concrete Reinforcing)

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Smith, David, Steel Co., Inc., 234—46th St., Brooklyn, N. Y.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BARS (Iron)

Ryerson, Jos. T., & Sons, Inc., 16th & Rockwell Sts., Chicago, Ill.

BARS (Steel) (*Also Stainless)

*Allegheny Ludlum Steel Corp., Dept. S-5, Brackenridge, Pa.
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
*Bethlehem Steel Co., Bethlehem, Pa.
Calcos Steel & Iron Co., 1332 North 30th St., Philadelphia, Pa.
*Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
*Carpenter Steel Co., 139 Bern St., Reading, Pa.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
*Copperweld Steel Co., Warren, O.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
*Firth-Sterling Steel Co., McKeesport, Pa.
*Frasse, Peter A., & Co., Inc., 17 Grand St., New York, N. Y.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
*Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
Purdy, A. R., Co., Inc., 792 Greenwich St., New York City.
*Republic Steel Corp., Dept. ST, Cleveland, O.
*Rustless Iron & Steel Corp., 3400 E. Chase St., Baltimore, Md.
*Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Smith, David, Steel Co., Inc., 234—46th St., Brooklyn, N. Y.
Stanley Works, The, New Britain & Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
*United States Steel Supply Co., 1316 Wabansia Ave., Chicago, Ill.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BASES—(Welded Steel)

Mahon, The R. C., Co., 8650 Mt. Elliott Ave., Detroit, Mich.

BATHS (Heat Treating, Cyanide, Salt)

Holden, A. F., Co., The, 200 Winchester Ave., New Haven, Conn.
Mahr Mfg. Co., 1702 N. Second St., Minneapolis, Minn.

BATTERIES (Storage)

Edison Storage Battery Div. of Thomas A. Edison, Inc., West Orange, N. J.
Electric Storage Battery Co., The, 19th St. and Allegheny Ave., Philadelphia, Pa.
Graybar Electric Co., 420 Lexington Ave., New York City.

BATTERY CHARGING APPARATUS

Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City
Mallory, P. R., & Co., 3029 E. Washington Ave., Indianapolis, Ind.
Ward Leonard Electric Co., 65 South St., Mt. Vernon, N. Y.
Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.

BEAMS, CHANNELS, ANGLES, ETC. (Aluminum or Magnesium)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
Dow Chemical Co., The, Midland, Mich.

BEAMS, CHANNELS, ANGLES ETC. (Steel) (*Also Stainless)

Bethlehem Steel Co., Bethlehem, Pa.
Calcos Steel & Iron Co., 1332 North 30th St., Philadelphia, Pa.
*Carnegie-Illinois Steel Corp. Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
International Nickel Co., Inc., The, 67 Wall St., New York City
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh, Pa.
*Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Smith, David, Steel Co., Inc., 234—46th St., Brooklyn, N. Y.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BEARINGS (Aluminum, Brass or Bronze)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
Ampco Metal, Inc., Dept. S-7, 3830 W. Burnham St., Milwaukee, Wis.
Bohn Aluminum & Brass Corp., Lafayette Bldg., Detroit, Mich.
Cadman, A. W., Mfg. Co., 28th & Smallman St., Pittsburgh, Pa.
Howard Foundry Co., 4900 Bloomingdale Rd., Chicago, Ill.
Johnson Bronze Co., 550 S. Mill St., New Castle, Pa.
Mueller Brass Co., Port Huron, Mich.
National Bearing Metals Corp., 4930 Manchester Ave., St. Louis, Mo.
Shenango-Penn Mold Co., 411 W. Third St., Dover, O.

BEARINGS (Babbitt)

Hill Acme Co., 6400 Breakwater Ave., Cleveland, O.
Johnson Bronze Co., 550 S. Mill St., New Castle, Pa.
Link-Belt Co., 2410 W. 18th St., Chicago, Ill.
Medart Co., The, 3520 DeKalb St., St. Louis, Mo.
National Bearing Metals Corp., 4930 Manchester Ave., St. Louis, Mo.
National Lead Co., 111 Broadway, New York City

BEARINGS (Ball)

Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
Bantam Bearings Div., The Torrington Co., South Bend, Ind.
Dodge Manufacturing Corp., Mishawaka, Ind.
Fafnir Bearing Co., New Britain, Conn.
Kaydon Engineering Co., The, Muskegon, Mich.
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.
New Departure Div., General Motors Corp., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Torrington Co., The, Torrington, Conn.

BEARINGS (Graphite)

National Carbon Co., W. 117th St. & Madison Ave., Cleveland, Ohio.
United States Graphite Co., The, Saginaw, Mich.

BEARINGS (Journal)

Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
Bantam Bearings Div., The Torrington Co., South Bend, Ind.
Dodge Manufacturing Corp., Mishawaka, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Division, General Motors Corp., Harrison, N. J.
Kaydon Engineering Co., The, Muskegon, Mich.
Link-Belt Co., 2410 W. 18th St., Chicago, Ill.
Medart Co., The, 3520 DeKalb St., St. Louis, Mo.
National Bearing Metals Corp., 4930 Manchester Ave., St. Louis, Mo.
National Lead Co., 111 Broadway, New York City
Norma-Hoffman Bearings Corp., Stamford, Conn.
Rollway Bearing Co., Inc., 541 Seymour St., Syracuse, N. Y.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Needle)

Bantam Bearings Div., The Torrington Co., South Bend, Ind.
Torrington Co., The, Torrington, Conn.

BEARINGS (Non-Metallic)

American Brake Shoe Co., American Brakeblock Div., 4600 Merritt Ave., Detroit, Mich.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.

BEARINGS (Oilless)

Johnson Bronze Co., 550 S. Mill St., New Castle, Pa.
Rhoades, R. W., Metaline Co., 50-17 Fifth St., Long Island City, N. Y.

BEARINGS (Quill)

Bantam Bearings Div., The Torrington Co., South Bend, Ind.

BEARINGS (Radial)

Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
American Roller Bearing Co., 416 Melwood St., Pittsburgh, Pa.
Bantam Bearings Div., The Torrington Co., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Div., General Motors Corp., Harrison, N. J.
Kaydon Engineering Co., The, Muskegon, Mich.
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.
Medart Co., The, 3520 DeKalb St., St. Louis, Mo.
New Departure Div., General Motors Corp., Bristol, Conn.
Norma-Hoffman Bearings Corp., Stamford, Conn.
Rollway Bearing Co., Inc., 541 Seymour St., Syracuse, N. Y.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Roll Neck)

American Roller Bearing Co., 416 Melwood St., Pittsburgh, Pa.
Bantam Bearings Div., The Torrington Co., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Div., General Motors Corp., Harrison, N. J.
Kaydon Engineering Co., The, Muskegon, Mich.
Morgan Construction Co., Worcester, Mass.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Rollway Bearing Co., Inc., 541 Seymour St., Syracuse, N. Y.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Roller)

Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
American Roller Bearing Co., 416 Melwood St., Pittsburgh, Pa.
Bantam Bearings Div., The Torrington Co., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Dodge Manufacturing Corp., Mishawaka, Ind.
Hyatt Bearings Div., General Motors Corp., Harrison, N. J.
Kaydon Engineering Co., The, Muskegon, Mich.
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.
Medart Co., The, 3520 DeKalb St., St. Louis, Mo.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Rollway Bearing Co., Inc., 541 Seymour St., Syracuse, N. Y.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Roller Tapered)

Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
Bantam Bearings Div., The Torrington Co., South Bend, Ind.
Dodge Manufacturing Corp., Mishawaka, Ind.
Kaydon Engineering Co., The, Muskegon, Mich.
Medart Co., The, 3520 DeKalb St., St. Louis, Mo.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Rolling Mill)

American Brake Shoe Co., American Brakeblock Div., 4600 Merritt Ave., Detroit, Mich.
American Roller Bearing Co., 416 Melwood St., Pittsburgh, Pa.
Bantam Bearings Div., The Torrington Co., South Bend, Ind.
Hyatt Bearings Div., General Motors Corp., Harrison, N. J.
Kaydon Engineering Co., The, Muskegon, Mich.

BEARINGS (Rolling Mill)—Cont.

Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.
Morgan Construction Co., Worcester, Mass.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Sealed)

Norma-Hoffmann Bearings, Corp., Stamford, Conn.

BEARINGS (Shaft Hanger)

Dodge Manufacturing Corp., Mishawaka, Ind.
Medart Co., The, 3520 DeKalb St., St. Louis, Mo.
Norma-Hoffmann Bearings Corp., Stamford, Conn.

BEARINGS (Thrust)

Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
American Roller Bearing Co., 416 Melwood St., Pittsburgh, Pa.
Bantam Bearings Div. The Torrington Co., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Kaydon Engineering Co., The, Muskegon, Mich.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Roilway Bearing Co., Inc., 541 Seymour St., Syracuse, N. Y.
SKF Industries, Inc., Front St., and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BELTING (Flat Transmission)

Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia, Pa.
Manheim Belting & Mfg. Co., Manheim, Pa.

BELTING (V-Drive)

Manheim Belting & Mfg. Co., Manheim, Pa.

BENDING AND STRAIGHTENING MACHINES

Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown, O.
Alliance Machine Co., The, Alliance, O.
American Foundry Equipment Co., The, 509 S. Byrkit St., Mishawaka, Ind.
Baldwin Southark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Beatty Machine & Mfg. Co., Hammond, Ind.
Buffalo Forge Co., 158 Mortimer St., Buffalo, N. Y.
Cleveland Crane & Engineering Co., The, Steelweld Machinery Div., The, 1125 E. 283rd St., Wickliffe, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Consolidated Machine Tool Corp., Winton & Blossom Roads, Rochester, N. Y.
Denison Engineering Co., The, 1163 Dublin Rd., Columbus, O.
Farquhar, A. B., Co., Ltd., 195 Duke St., York, Pa.
Farrell-Cheek Steel Co., Sandusky, O.
Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago, Ill.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Hydropress, Inc., 570 Lexington Ave., New York City.
Kardong Bros., Inc., 346 Buchanan St., Minneapolis, Minn.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Lewis Machine Co., 3450 E. 76th St., Cleveland, O.
Lovemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Medart Co., The, 3520 DeKalb St., St. Louis, Mo.
Morgan Engineering Co., The, Alliance, O.
O'Neil-Irwin Mfg. Co., 304 8th Ave. S., Minneapolis, Minn.
Shuster, F. B., Co., The, New Haven, Conn.
Taylor-Wilson Mfg. Co., 15 Thomson Ave., McKees Rocks, Pa.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.
Watson-Stillman Co., Roselle, N. J.
Wean Engineering Co., Inc., The Warren, O.
Webb Corp., The, Webb City, Mo.
Yoder Co., The, 55 Walworth Ave., Cleveland, O.

BENZOL AND TOLUOL RECOVERY PLANTS

Koppers Co., Engineering and Construction Div., 300 Koppers Bldg., Pittsburgh, Pa.

BILLETS (Forging)

Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., 139 Bern St., Reading, Pa.
Copperweld Steel Co., Warren, O.
Heppenstall Co., Box S-12 4620 Hatfield St., Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Stanley Works, The, New Britain & Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BILLETS AND BLOOMS (Alloy & Carbon Steel) (*Also Stainless)

*Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
*Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Steel Corp., Kokomo, Ind.
*Copperweld Steel Co., Warren, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
*Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Keystone Steel & Wire Co., Dept. A.C., Peoria, Ill.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Stanley Works, The, New Britain & Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The Steel & Tube Div., Canton, O.
Washburn Wire Co., Phillipsdale, R. I.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BILLETS—ALUMINUM (Forging)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.

BIMETALS

Mallory & Co., P. R., 3029 E. Washington Ave., Indianapolis, Ind.

BLACKING (Graphite)

United States Graphite Co., The, Saginaw, Mich.

BLAST FURNACE AIR CONDITIONING

Koppers Co., Engineering & Construction Div., 300 Koppers Bldg., Pittsburgh, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Surface Combustion Div. of General Properties Co., Inc., 2375 Derr St., Toledo, O.
Worthington Pump & Machinery Corp., Harrison, N. J.

BLAST FURNACE CLEANING (Gas)

McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

BLAST FURNACE HOT BLAST STOVES

McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

BLAST FURNACE SPECIALTIES

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

BLAST FURNACE STOCK HOUSES

McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

BLAST FURNACES

Freyn Engineering Co., 310 S. Michigan Ave., Chicago, Ill.
McKee, Arthur G. & Co., 2300 Chester Ave., Cleveland, O.
Pollock, Wm. B. Co., The, 101 Andrews Ave., Youngstown, O.

BLOCKS (Chain)

Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.
Reading Chain & Block Corp., 2102 Adams St., Reading, Pa.

BLOW PIPE SYSTEMS

Mahon, The R. C., Co., 8650 Mt. Elliott Ave., Detroit, Mich.

BLOWERS

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Buffalo Forge Co., 158 Mortimer St., Buffalo, N. Y.
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
Mahr Mfg. Co., 1702 N. Second St., Minneapolis, Minn.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

BLOWPIPES (Oxy-Acetylene)

Linde Air Products Co., The, 30 E. 42nd St., New York City.

BLUE PRINTING MACHINES AND ACCESSORIES

Wickes Brothers, Saginaw, Mich.

BOILER HEADS

Bethlehem Steel Co., Bethlehem, Pa.

BOILERS (Water Tube)

Babcock & Wilcox Co., The, 85 Liberty St., New York City.

BOILER TUBES—See TUBES (Boiler)

BOILERS

Oil Well Supply Co., Dallas, Texas.

BOLT AND NUT MACHINERY

Denison Engineering Co., The, 1163 Dublin Rd., Columbus, O.
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., The, Tiffin, O.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

BOLTS (*Also Stainless)

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland Cap Screw Co., 2917 E. 79th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
*Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa.
*Harper, H. M., Co., The, 2646 Fletcher St., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
*Oliver Iron & Steel Corp., S. 10th & Muriel Sts., Pittsburgh, Pa.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
*Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

BOLTS (Carriage and Machine)

Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2917 E. 79th St., Cleveland, O.
Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Oliver Iron & Steel Corp., S. 10th & Muriel Sts., Pittsburgh, Pa.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Triplex Screw Co., 5341 Grant Ave., Cleveland, O.

BOLTS (Nonferrous)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
Harper, H. M., Co., The, 2646 Fletcher St., Chicago, Ill.
Oliver Iron & Steel Corp., S. 10th & Muriel Sts., Pittsburgh, Pa.

BOLTS (Special)

Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2917 E. 79th St., Cleveland, O.
Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Oliver Iron & Steel Corp., S. 10th & Muriel Sts., Pittsburgh, Pa.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS (Stove)

American Screw Company, Providence, R. I.
Central Screw Co., 3517 Shields Ave., Chicago, Ill.
Cleveland Cap Screw Co., 2917 E. 79th St., Cleveland, O.
Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Triplex Screw Co., 5341 Grant Ave., Cleveland, O.

BOLTS (Stove, Recessed Head)

American Screw Co., Providence, R. I.
Bristol Co., Waterbury, Conn.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Mfg. Co., Waterbury, Conn.

BOLTS (Track)

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Oliver Iron & Steel Corp., S. 10th & Muriel Sts., Pittsburgh, Pa.

BOLTS (Track)—Cont.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

BORING MILLS
Barnes, W. F. and John, Co., Rockford, Ill.
Consolidated Machine Tool Corp., Winton & Blossom Rds., Rochester, N. Y.
Cross Gear & Machine Co., 3250 Bellevue Ave., Detroit, Mich.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Fosdick Machine Tool Co., The, 1638 Blue Rock St., Cincinnati, O.
Heald Machine Co., Worcester, Mass.
Ohio Machine Tool Co., The, Kenton, O.
Sellers, William, & Co., Inc., 16th & Callowhill Sts., Philadelphia, Pa.

BORING MILLS (Vertical)
Bullard Co., The, Bridgeport, Conn.
Consolidated Machine Tool Corp., Winton & Blossom Rds., Rochester, N. Y.

BORING TOOLS (Carbide Tipped)
Carboloy Co., Inc., 11141 E. 8 Mile Rd., Detroit, Mich.
Genesee Tool Co., Fenton, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

BORING TOOLS (Diamond)
Smit, J. K., & Sons, Inc., 157 Chambers St., New York City.

BOXES (Open Hearth Charging)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Mesta Machine Co., P. O., Box 1466, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.

BRAKE DRUMS
Ladish Drop Forge Co., Cudahy, Wis.

BRAKE LININGS
American Brake Shoe Co., American Brakeblock Div., 4600 Merritt Ave., Detroit, Mich.
Johns-Manville Corp., 22 E. 40th St., New York City.

BRAKES (Electric)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.

BRAKES (Hand)
O'Neil-Irwin Mfg. Co., 304 8th Ave. So., Minneapolis, Minn.

BRICK (Abrasive)
Chicago Wheel & Manufacturing Co., Dept. ST-7, 1101 W. Monroe St., Chicago, Ill.

BRICK (Acid Resisting)
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.
National Carbon Co., W. 117th St. & Madison Ave., Cleveland, O.

BRICK (Chrome)
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.

BRICK (Fire Clay)
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.
Laclede-Christy Clay Products Co., Ambassador Bldg., St. Louis, Mo.

BRICK (Forsterite)
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.
Laclede-Christy Clay Products Co., Ambassador Bldg., St. Louis, Mo.

BRICK (High Alumina)
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.
Laclede-Christy Clay Products Co., Ambassador Bldg., St. Louis, Mo.

BRICK (Insulating)—See INSULATING BRICK

BRICK (Ladle)
Globe Brick Co., The, East Liverpool, O.
Harbison-Walker, Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.
Laclede-Christy Clay Products Co., Ambassador Bldg., St. Louis, Mo.

BRICK (Magnesia)
Harbison-Walker, Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.

BRICK (Refractory)—See REFRACTORIES, CEMENT, ETC.

BRICK (Silica)
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.

BRICK (Silicon Carbide)
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Mass.

BRICK (Sleeves, Nozzles, Runners, Tuyeres)
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.
Laclede-Christy Clay Products Co., Ambassador Bldg., St. Louis, Mo.
National Fireproofing Corp., 202 E. Ohio St., Pittsburgh, Pa.

BRIDGE CRANES (Ore and Coal Handling)—See CRANES—BRIDGE (Ore & Coal Handling)

BRIDGES, BUILDINGS, VIADUCTS, STACKS, ETC.
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Belmont Iron Works, 22nd St., and Washington Ave., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Blaw-Knox Co., Blawnox, Pa.
Columbia Steel Co., San Francisco, Calif.
Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh, Pa.
Mahon, The R. C., Co., 8650 Mt. Elliott Ave., Detroit, Mich.

BROACHES
Colonial Broach Co., P.O. Box No. 37, Harper Sta., Detroit, Mich.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Lapointe Machine Tool Co., The, 34 Tower St., Hudson, Mass.

BROACHING MACHINES
American Broach & Machine Co., Ann Arbor, Mich.
Cincinnati Milling Machine Co., Cincinnati, O.
Colonial Broach Co., 147 Jos. Campau, Detroit, Mich.
Lapointe Machine Tool Co., The, 34 Tower St., Hudson, Mass.

BRUSHES (Carbon)
National Carbon Co., W. 117th St. & Madison Ave., Cleveland, O.
United States Graphite Co., The, Saginaw, Mich.

BRUSHES (Industrial)
Fuller Brush Co., The, Industrial Div. Sc, 3582 Main St., Hartford, Conn.
Pittsburgh Plate Glass Co., Brush Div., Frederick Ave., Baltimore, Md.

BUCKETS (Clam Shell, Dragline, Grab, Single Line)
American Brake Shoe Co., American Manganese Steel Div., 389 E. 14th St., Chicago, Ill.
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Blaw-Knox Co., Blawnox, Pa.
Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Osgood Co., The, Marion, O.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.

BUCKETS (Elevator)
Hendrick Mfg. Co., Carbondale, Pa.
Jeffrey Mfg. Co., 889-99 N. Fourth St., Columbus, O.

BUCKETS (Single Hook, Automatic Dump, Automatic Single Line)
Blaw-Knox Co., Blawnox, Pa.
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.
Chase Fdry. & Mfg. Co., 2300 S. Parsons Ave., Columbus, O.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.

BUFFERS (Electric Portable)
Chicago Wheel & Manufacturing Co., Dept. ST-7, 1101 W. Monroe St., Chicago, Ill.
Graybar Electric Co., 420 Lexington Ave., New York City

BUILDINGS (Steel)—See BRIDGES BUILDINGS, ETC.

BULLDOZERS
Beatty Machine & Mfg. Co., Hammond, Ind.
Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Watson-Stillman Co., Roselle, N. J.

BURNERS (Acetylene)—See TORCHES AND BURNERS

BURNERS (Automatic)
Bloom Engineering Co., 916 Behan St., Pittsburgh, Pa.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Surface Combustion Div. of General Properties Co., Inc., 2375 Dorr St., Toledo, O.
Wilson, Lee, Engineering Co., 20005 Lake Rd., Cleveland, O.

BURNERS (Pulverized Coal, Oil, Gas, Combination)
Babcock & Wilcox Co., The, 85 Liberty St., New York City.
Bloom Engineering Co., 916 Behan St., Pittsburgh, Pa.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Johnson Gas Appliance Co., 591 "E" Ave., N.W., Cedar Rapids, Iowa
Maehler, Paul, Co., The, 2208 W. Lake St., Chicago, Ill.
Mahr Mfg. Co., 1702 N. Second St., Minneapolis, Minn.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Surface Combustion Div. of General Properties Co., Inc. 2375 Dorr St., Toledo, O.
Wilson, Lee, Engineering Co., 20005 Lake Rd., Cleveland, O.

BURNISHING, GRINDING, LAPPING OR POLISHING COMPOUNDS
Carborundum Co., The, Niagara Falls, N. Y.
Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul, Minn.
Oakite Products, Inc., 22 Thames St., New York City.
Sun Oil Co., Dept. 1, 1603 Walnut St., Philadelphia, Pa.

BUSHINGS (Bronze)
Ampco Metal, Inc., Dept. S-7, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 28th & Smallman St., Pittsburgh, Pa.
Johnson Bronze Co., 550 S. Mill St., New Castle, Pa.
National Bearing Metals Corp., 4930 Manchester Ave., St. Louis, Mo.
Shenango-Penn Mold Co., 411 W. Third St., Dover, O.

BUSHINGS (Jig)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

BUSHINGS (Oilless)
Rhoades, R. W., Metaline Co., 50-17 Fifth St., Long Island City, N. Y.

BUTTS
Veeder-Root, Inc., Hartford, Conn.

BY-PRODUCT PLANTS
Koppers Co., Engineering and Construction Div., 300 Koppers Bldg., Pittsburgh, Pa.

CABINETS (Refrigeration)
General Electric Company (Air Conditioning & Commercial Refrigeration Dept., Div. 437), Bloomfield, N. J.
Motor Products Corp., Deep Freeze Div., 2309 Davis St., N. Chicago, Ill.
Westinghouse Electric & Mfg. Co., Mansfield, O.

CABINETS (Steel)
Republic Steel Corp., Berger Mfg. Div., Canton, O.

CABLE (Electric)—See WIRE & CABLE (Electric)

CADMIUM
American Zinc, Lead & Smelting Co., Paul Brown Building, St. Louis, Mo.
St. Joseph Lead Co., 250 Park Ave., New York City.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

CADMIUM PLATING PROCESSES AND EQUIPMENT
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

CAISSONS (Pneumatic)
Dravo Corp., (Contracting Div.), Neville Island, Pittsburgh, Pa.

CALCIUM METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.

CAMSHAFTS
Ladish Dron Forge Co., Cudahy, Wis.

CAP SCREWS—See SCREWS (Cap, Set, Safety-Set)

CAPACITATORS (Electric)
Mallory & Co., P. R., 3029 E. Washington Ave., Indianapolis, Ind.

CAPSTANS (Electric, Gasoline, Diesel)
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

CAR DUMPERS
Alliance Machine Co., The, Alliance, O.
Industrial Brownhoist Corp., Bay City, Mich.
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.

CAR PULLERS and SPOTTERS
Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago, Ill.
Diamond Iron Works, Inc., Minneapolis, Minn.
Link-Belt Co., 2410 W. 18th St., Chicago, Ill.
Silent Hoist Winch and Crane Co., 849 63rd St., Brooklyn, N. Y.

CARBIDE

Linde Air Products Co., The, 30 E. 42nd St., New York City.
National Carbide Corp., 60 E. 42nd St., New York City.
Shawinigan Products Corp., Empire State Bldg., New York City.

CARBIDE METALS (Special Parts)

Firth-Sterling Steel Co., McKeesport, Pa.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

CARBIDE TOOLS (Steel Cutting)

Carboloy Co., Inc., 11141 E. 8 Mile Rd., Detroit, Mich.
Eliott Mfg. Co., Milford, Conn.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Genesee Tool Co., Fenton, Mich.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.
Wesson Company, Ferndale Station, Detroit, Mich.

CARBON SPECIALTIES

National Carbon Co., W. 117th St. & Madison Ave., Cleveland, O.
United States Graphite Co., The, Saginaw, Mich.

CARBURIZING (Pack or Gas)

Commercial Metals Treating, Inc., 177 S. St. Clair St., Toledo, O.
Lakeside Steel Improvement Co., The, 5418 Lakeside Ave., Cleveland, O.

CARS (Charging)

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Chase Fdry. & Mfg. Co., 2300 S. Parsons Ave., Columbus, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.

CARS (Dump)

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Chase Fdry. & Mfg. Co., 2300 S. Parsons Ave., Columbus, O.
Differential Steel Car Co., Findlay, O.
Easton Car & Construction Co., Easton, Pa.
Pressed Steel Car Co., (Industrial Div.) Koppers Bldg., Pittsburgh, Pa.

CARS (Foundry Core)

Chase Fdry. & Mfg. Co., 2300 S. Parsons Ave., Columbus, O.

CARS (Hot Metal Transfer)

Bartlett Hayward Div., Koppers Co., Baltimore, Md.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.

CARS (Industrial and Mining)

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Chase Fdry. & Mfg. Co., 2300 S. Parsons Ave., Columbus, O.
Differential Steel Car Co., Findlay, O.
Easton Car & Construction Co., Easton, Pa.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.
Pressed Steel Car Co., (Industrial Div.) Koppers Bldg., Pittsburgh, Pa.

CARS (Scale)

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.

CASTING WASHER EQUIPMENT

Pangborn Corp., Hagerstown, Md.

CASTINGS (Acid Resisting)

Allegheny Ludlum Steel Corp., Dept. S-5, Brackenridge, Pa.
American Brake Shoe Co., American Manganese Steel Div., 389 E. 14th St., Chicago, Ill.
Ampco Metal, Inc., Dept. S-7, 3830 W. Burnham St., Milwaukee, Wis.
Babcock & Wilcox Co., The, 85 Liberty St., New York City.
Cadman, A. W., Mfg. Co., 28th & Smallman St., Pittsburgh, Pa.
International Nickel Co., Inc., The, 67 Wall St., New York City.
Lebanon Steel Foundry, Lebanon, Pa.
Meehanite Research Institute, Pershing Bldg., New Rochelle, N. Y.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
Shenango-Penn Mold Co., 411 W. Third St., Dover, O.

CASTINGS (Alloy Iron)

American Brake Shoe Co., Brake Shoe & Castings Div., 230 Park Ave., New York City.
Meehanite Research Institute, Pershing Bldg., New Rochelle, N. Y.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.

CASTINGS (Alloy Steel)

Allegheny Ludlum Steel Corp., Dept. S-3, Brackenridge, Pa.
American Brake Shoe Co., American Manganese Steel Div., 389 E. 14th St., Chicago, Ill.
Babcock & Wilcox Co., The, 85 Liberty St., New York City.
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Electro Alloys Co., The, Elyria, O.
Farrell-Cheek Steel Co., Sandusky, O.
Lebanon Steel Foundry, Lebanon, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Michiana Products Co., Michigan City, Ind.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
Ohio Steel Foundry Co., Lima & Springfield, O.
Pittsburgh Rolls Div., Blaw-Knox Co., Pittsburgh, Pa.
Union Steel Castings Div. of Blaw-Knox Co., 62nd & Butler Sts., Pittsburgh, Pa.
United Engineering & Foundry Co., 1st National Bank Bldg., Pittsburgh, Pa.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

CASTINGS (Aluminum, Brass, Bronze, Copper)

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
Ampco Metal, Inc., Dept. S-7, 3830 W. Burnham St., Milwaukee, Wis.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Bohn Aluminum & Brass Corp., Lafayette Bldg., Detroit, Mich.
Cadman, A. W., Mfg. Co., 28th & Smallman St., Pittsburgh, Pa.
Century Foundry Co., 3727 Market St., St. Louis, Mo.
Grinnell Co., Inc., Providence, R. I.
Hammond Brass Works, 1844 Summer St., Hammond, Ind.
Homestead Valve Mfg. Co., P. O. Box 22, Coraopolis, Pa.
Howard Foundry Co., 4900 W. Bloomingdale Ave., Chicago, Ill.
Johnson Bronze Co., 550 S. Mill St., New Castle, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Mueller Brass Co., Port Huron, Mich.
Morgan Engineering Co., The, Alliance, O.
National Bearing Metals Corp., 4930 Manchester Ave., St. Louis, Mo.
Shenango-Penn Mold Co., 411 W. Third St., Dover, O.
Wellman Bronze & Aluminum Co., The, 2539 E. 93 St., Cleveland, O.

CASTINGS (Corrosion Resisting)

Allegheny Ludlum Steel Corp., Dept. S-5, Brackenridge, Pa.
American Brake Shoe Co., Brake Shoe & Castings Div., 230 Park Ave., New York City.
International Nickel Co., Inc., The, 67 Wall St., New York City
Lebanon Steel Foundry, Lebanon, Pa.
Meehanite Research Institute, Pershing Bldg., New Rochelle, N. Y.
Michiana Products Corp., Michigan City, Ind.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
National Lead Co., 111 Broadway, New York City

CASTINGS (Electric Steel)

Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Farrell-Cheek Steel Co., Sandusky, O.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Lebanon Steel Foundry, Lebanon, Pa.
Reading Steel Casting Div. of American Chain & Cable Co. Inc., Reading, Pa.
West Steel Casting Co., The, 805 E. 70th St., Cleveland, O.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

CASTINGS (Gray Iron, Alloy or Semi-Steel)

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Brake Shoe Co., Brake Shoe & Castings Div., 230 Park Ave., New York City.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Century Foundry Co., 3727 Market St., St. Louis, Mo.
Columbia Steel Co., San Francisco, Calif.
Davenport-Besler Corp., Davenport, Iowa
Diamond Iron Works, Inc., Minneapolis, Minn.
Erie Foundry Co., Erie, Pa.
Ferracute Machine Co., Bridgeton, N. J.
Grinnell Co., Inc., Providence, R. I.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hill Acme Co., 6400 Breakwater Ave., Cleveland, O.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
International Nickel Co., Inc., The, 67 Wall St., New York City
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Medart Co., The 3520 DeKalb St., St. Louis, Mo.
Meehanite Research Institute, Pershing Bldg., New Rochelle, N. Y.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Oil Well Supply Co., Dallas, Texas.
Shenango-Penn Mold Co., 411 W. Third St., Dover, O.

CASTINGS (Heat Resisting)

Allegheny Ludlum Steel Corp., Dept. S-5, Brackenridge, Pa.
American Brake Shoe Co., Brake Shoe & Castings Div., 230 Park Ave., New York City.
Babcock & Wilcox Co., The, 85 Liberty St., New York City.
Electro Alloys Co., The, Elyria, O.
International Nickel Co. Inc., The, 67 Wall Street, New York City.
Lebanon Steel Foundry, Lebanon, Pa.
Meehanite Research Institute, Pershing Bldg., New Rochelle, N. Y.
Michiana Products Co., Michigan City, Ind.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
Shenango-Penn Mold Co., 411 W. Third St., Dover, O.

CASTINGS (Magnesium)

Bohn Aluminum & Brass Corp., Lafayette Bldg., Detroit, Mich.
Dow Chemical Co., The, Midland, Mich.
Hills-McCanna Co., 2434 Nelson St., Chicago, Ill.
Howard Foundry Co., 4900 W. Bloomingdale Ave., Chicago, Ill.

CASTINGS (Malleable)

American Chain Div., American Chain & Cable Co. Inc., York, Pa.
Grinnell Co., Inc., Providence, R. I.
Lake City Malleable Co., 5026 Lakeside Ave., Cleveland, O.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.
Saginaw Malleable Iron Div. General Motors Corp., Saginaw, Mich.

CASTINGS (Steel) (*Also Stainless)

*Allegheny Ludlum Steel Corp., Dept. S-5, Brackenridge, Pa.
American Brake Shoe Co., American Manganese Steel Div., 389 E. 14th St., Chicago, Ill.
Babcock & Wilcox Co., The, 85 Liberty St., New York City.
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Roll & Steel Fdry Co., E. Chicago, Ind.
Farrell-Cheek Steel Co., Sandusky, O.
Ferracute Machine Co., Bridgeton, N. J.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
*Lebanon Steel Foundry, Lebanon, Pa.
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Mackintosh-Hemphill Co., 9th & Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
*Michiana Products Co., Michigan City, Ind.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Ohio Steel Foundry Co. Lima & Springfield, O.
Oil Well Supply Co., Dallas, Texas.
Pittsburgh Rolls, Div. of Blaw-Knox Co., Pittsburgh, Pa.
Saginaw Malleable Iron Div. General Motors Corp., Saginaw, Mich.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Steel Founders' Society of America, 720 Midland Bldg., Cleveland, O.
Strong Steel Fdry. Co., Hertel & Norris Aves., Buffalo, N. Y.
Union Steel Casting Div. of Blaw-Knox Co., 62nd and Butler Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
West Steel Casting Co., The, 805 E. 70th St., Cleveland, O.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

CASTINGS (Wear Resisting)

American Brake Shoe Co., Brake Shoe & Castings Div., 230 Park Ave., New York City.
Farrell-Cheek Steel Co., Sandusky, O.
Hagan, George J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Lebanon Steel Foundry, Lebanon, Pa.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.
Meehanite Research Institute, Pershing Bldg., New Rochelle, N. Y.
Michiana Products Corp., Michigan City, Ind.
Saginaw Malleable Iron Div. General Motors Corp., Saginaw, Mich.
Shenango-Penn Mold Co., 411 W. Third St., Dover, O.

CASTINGS (Worm and Gear Bronze)

Ampco Metal, Inc., Dept. S-7, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 28th & Smallman St., Pittsburgh, Pa.

CEMENT (Acid Proof)

Laclede-Christy Clay Products Co., Ambassador Bldg., St. Louis, Mo.
National Carbon Co., W. 117th St. & Madison Ave., Cleveland, O.
Quigley Company Inc., 56 W. 45th St., New York City.
Pennsylvania Salt Mfg. Co., Widener Bldg., Philadelphia, Pa.

CEMENT (Elastic)

Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul, Minn.

CEMENT (High Temperature)

Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., The, Perth Amboy, N. J.
Johns-Manville Corp., 22 E. 40th St., New York City.
Laclede-Christy Clay Products Co., Ambassador Bldg., St. Louis, Mo.
Norton Company, Worcester, Mass.
Pennsylvania Salt Mfg. Co., Widener Bldg., Philadelphia, Pa.

CEMENT (High Temperature Hydraulic)

Atlas Lumnite Cement Co. Dept. S, Chrysler Bldg., New York City.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Laclede-Christy Clay Products Co., Ambassador Bldg., St. Louis, Mo.

CENTRAL STATION EQUIPMENT

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa

CHAIN (Conveyor and Elevator)

American Brake Shoe Co., American Manganese Steel Div., 389 E. 14th St., Chicago, Ill.
Farrell-Cheek Steel Co., Sandusky, O.
Jeffrey Mfg. Co., 889-99 N. Fourth St., Columbus, O.
Link-Belt Co., 220 S. Belmont Ave. Indianapolis, Ind.

CHAIN (Draw Bench)

Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Malleable)

Jeffrey Mfg. Co., 889-99 N. Fourth St., Columbus, O.
Lake City Malleable Co., 5026 Lakeside Ave., Cleveland, O
Medart Co., The, 3520 DeKalb St., St. Louis, Mo.

CHAIN (Power Transmission)

Jeffrey Mfg. Co., 889-99 N. Fourth St., Columbus, O.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Roller)

Jeffrey Mfg. Co., 889-99 N. Fourth St., Columbus, O.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Sling)

American Chain Div., American Chain & Cable Co., York, Pa.
McKay Co., The, York, Pa.

CHAIN (Welded & Weldless)

American Chain Div., American Chain & Cable Co. Inc., York, Pa.
McKay Co., The, York, Pa.

CHANNELS—See BEAMS, CHANNELS, ANGLES

CHARGING BOXES

Union Steel Castings Div. of Blaw-Knox Co., 62nd & Butler Sts., Pittsburgh, Pa.

CHARGING MACHINES (Cupola)

Atlas Car & Mfg. Co., The, Alliance, O.
1100 Ivanhoe Rd., Cleveland, O.

CHARGING MACHINES (Open Hearth)

Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.

CHECKER BRICK

Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

CHECKS (Metal)

Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.
Matthews, Jas. H., & Co., 3978 Forbes St., Pittsburgh, Pa.

CHECKS (Time & Tool)

St. Louis Button Co., 413-415 Lucas Ave., St. Louis, Mo.

CHEMICAL PROCESSING EQUIPMENT

Blaw-Knox Co., Blawnox, Pa.
Struthers Wells Corp., Titusville, Pa.

CHEMICALS (Industrial)

Metal & Thermit Corp., 120 Broadway, New York City.
Park Chemical Co., 8076 Military Ave., Detroit, Mich.
Pennsylvania Salt Mfg. Co., Widener Bldg., Philadelphia, Pa.
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.
Turco Products, Inc., 6135 S. Central Ave., Los Angeles, Calif.

CHILLING EQUIPMENT (Metal)

Motor Products Corp., Deep Freeze Div., 2309 Davis St., N. Chicago, Ill.

CHROME MORTAR

Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.
Laclede-Christy Clay Products Co., Ambassador Bldg., St. Louis, Mo.

CHROME ORE

Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

CHROMIUM METAL AND ALLOYS

Electro Metallurgical Co., 30 E. 42nd St., New York City.
Metal & Thermit Corp., 120 Broadway, New York City.
Vanadium Corp., of America, 420 Lexington Ave., New York City.

CHROMIUM PLATING PROCESSES AND EQUIPMENT

United Chromium, Inc., 51 E. 42nd St., New York City.

CHUCK OPERATING CYLINDERS

Anker-Holth Mfg. Co.—Airgrip Chuck Div., 332 S. Michigan Ave., Chicago, Ill.

CHUCKING MACHINES (Multiple Spindle)

Bullard Co., The, Bridgeport, Conn.
Cross Gear & Machine Co., 3250 Bellevue Ave., Detroit, Mich.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

CHUCKS

Apex Machine & Tool Co., 1025 S. Patterson Blvd., Dayton, O.
Bullard Co., The, Bridgeport, Conn.

CHUCKS (Automatic Closing)

Anker-Holth Mfg. Co.—Airgrip Chuck Div., 332 S. Michigan Ave., Chicago, Ill.

CLAMPS, CABLE (Sheet Metal)

Tinnerman Products, Inc., 2039 Fulton Rd., Cleveland, O.

CLAMPS (Drop Forged)

Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

CLEANERS (Steam)

Homestead Valve Mfg. Co., P. O. Box 22, Coraopolis, Pa.
Oakite Products, Inc., 22 Thames St., New York City.

CLEANERS AND FILTERS (Air)

Adams, R. P., Co., Inc., 75 Chicago St., Buffalo, N. Y.
Westinghouse Electric & Mfg. Co., 1216 W. 58th St., Cleveland, O.

CLEANING EQUIPMENT (Metal)

American Foundry Equipment Co., The, 509 S. Byrkit St., Mishawaka, Ind.
Bullard Co., The, Bridgeport, Conn.
Detroit Rex Products Co., 13029 Hillview Ave., Detroit, Mich.
Howard Eng. & Mfg. Co., The, 1052 Hulbert Ave., Cincinnati, 14, O.
Magnus Chemical Co., Inc., 206 South Ave., Garwood, N. J.
Pangborn Corporation Hagerstown, Md.
Ransohoff, N., Inc., 1317 Township Ave., Cincinnati, O.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Wean Engineering Co., Inc., The, Warren, O.

CLEANING SPECIALTIES

American Chemical Paint Co., Ambler, Pa.
Detroit Rex Products Co., 13029 Hillview Ave., Detroit, Mich.
MacDermid, Inc., Waterbury, Conn.
Magnus Chemical Co., Inc., 206 South Ave., Garwood, N. J.
Oakite Products, Inc., 22 Thames St., New York City.
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.
Quigley Company, Inc., 56 W. 45th St., New York City
Turco Products, Inc., 6135 S. Central Ave., Los Angeles, Calif.

CLUTCH FACINGS

American Brake Shoe Co., American Brakeblock Div., 4600 Merritt Ave., Detroit, Mich.
Johns-Manville Corp., 22 E. 40th St., New York City

CLUTCHES (Friction)

Diamond Iron Works, Inc., Minneapolis, Minn.
Dodge Manufacturing Corp., Mishawaka, Ind.
Hill Acme Co., 6400 Breakwater Ave., Cleveland, O.
Jones, W. A., Fdry. & Mach. Co., 4437 Roosevelt Rd., Chicago, Ill.
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Medart Co., The, 3520 DeKalb St., St. Louis, Mo.

CLUTCHES (Magnetic)

Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

COAL OR COKE

Alan Wood Steel Co., Conshohocken, Pa.
Cleveland-Cliffs Iron Co., The, Union Commerce Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Koppers Co., Gas & Coke Div., 300 Koppers Bldg., Pittsburgh, Pa.
Koppers Coal Div., Eastern Gas & Fuel Assoc., 300 Koppers Bldg., Pittsburgh, Pa.
New England Coal & Coke Co., Boston, Mass.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.

COAL, COKE, ORE, ASH HANDLING AND PROCESSING MACHINERY

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Easton Car & Construction Co., Easton, Pa.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Koppers Co., Engineering & Construction Div., 300 Koppers Bldg., Pittsburgh, Pa.
Jeffrey Mfg. Co., 889-99 N. Fourth St., Columbus, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Syntron Co., Homer City, Pa.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.

COILERS (Strip & Wire)

Lewis Fdry. & Mach. Div. of Blaw-Knox Co., Pittsburgh, Pa.

COILS (Direct Expansion)

General Electric Company (Air Conditioning & Commercial Refrigeration Dept. Div. 437), Bloomfield, N. J.
Westinghouse Electric & Mfg. Co., 653 Page Blvd., Springfield, Mass.

COILS (Electrical)

Anaconda Wire & Cable Co., 95 Broadway, New York City.

COILS (Water or Steam)

Flori Pipe Co., The, Red Bud & Bulwer Ave., St. Louis, Mo.
General Electric Company (Air Conditioning & Commercial Refrigeration Dept. Div. 437), Bloomfield, N. J.
Westinghouse Electric & Mfg. Co., 653 Page Blvd., Springfield, Mass.

COKE—See COAL or COKE

COKE OVEN MACHINERY

Alliance Machine Co., The, Alliance, O.
Atlas Car & Mfg. Co., The 1100 Ivanhoe Rd., Cleveland, O.
Koppers Co., Engineering & Construction Div., 300 Koppers Bldg., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.

COKE OVENS (By-Product)

Koppers Co., Engineering and Construction Div., 300 Koppers Bldg., Pittsburgh, Pa.

COLUMBIUM

Electro Metallurgical Co., 30 E. 42nd St., New York City.

COMBUSTION BOATS

Carborundum Co., The, Niagara Falls, N. Y.
Norton Company, Worcester, Mass.

COMBUSTION CONTROLS

Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
Morgan Construction Co., Worcester, Mass.
Norton Company, Worcester, Mass.

COMPARATORS (Optical)

Jones & Lamson Machine Co., Springfield, Vt.

COMPENSATORS (Automatic)

Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City
Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.

COMPOUNDS (Case Hardening, Heat Treating

Park Chemical Co., 8076 Military Ave., Detroit, Mich.

COMPOUNDS (Coppering, Metal Finishing, Rust Removing, Rust Preventing)

American Chemical Paint Co., Ambler, Pa.
Magnus Chemical Co., Inc., 206 South Ave., Garwood, N. J.
Oakite Products, Inc., 22 Thames St., New York City.
Turco Products, Inc., 6135 S. Central Ave., Los Angeles, Cal.

COMPOUNDS (Drawing and Stamping)

Acheson Colloids Corp., Port Huron, Mich.
Magnus Chemical Co., Inc., 206 South Ave., Garwood, N. J.
Oakite Products, Inc., 22 Thames St., New York City.

COMPOUNDS (Floor Cleaning)

Oakite Products, Inc., 22 Thames St., New York City.

COMPRESSORS (Air)

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Brake Shoe Co., Kellogg Div., 97 Humboldt St., Rochester, N. Y.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Curtis Pneumatic Machinery Div. of Curtis Mfg. Co., 1996 Kienlen Ave., St. Louis, Mo.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Worthington Pump & Machinery Corp., Harrison, N. J.

CONCRETE (Heat Resistant)

Atlas Lumnite Cement Co., Dept. S, Chrysler Bldg., New York City.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

CONCRETE REINFORCING BARS —See BARS (Concrete Reinforcing)

CONDENSERS (Surface, Barometric, Multi-Jet)

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
General Electric Company (Air Conditioning & Commercial Refrigeration Dept. Div. 437), Bloomfield, N. J.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
National Carbon Co., W. 117th St. & Madison Ave., Cleveland, O.
Ross Heater & Mfg. Co., 1407 West Ave., Buffalo, N. Y.
Westinghouse Electric & Mfg. Co., 653 Page Blvd., Springfield, Mass.
Worthington Pump & Machinery Corp., Harrison, N. J.

CONDUITS (Asbestos Cement)

Johns-Manville Corp., 22 E. 40th St., New York City

CONDUITS (Electric)

Anaconda Wire & Cable Co., 95 Broadway, New York City.
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City
Steel and Tubes Div., Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

CONDUITS (Wood)

Koppers Co., Wood Preserving Div., 300 Koppers Bldg., Pittsburgh, Pa.

CONNECTING RODS

Heppenstall Co., Box S-12, 4620 Hatfield St., Pittsburgh, Pa.
Kropp Forge Co., 5301 W. Roosevelt Rd., Chicago, Ill.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

CONTACTS & CONTACTORS (Electric)

Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
Graybar Electric Co., 420 Lexington Ave., New York City
Mallory, P. R., & Co., 3029 E. Washington Ave., Indianapolis, Ind.
National Carbon Co., W. 117th St. & Madison Ave., Cleveland, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.

CONTRACT WORK

Commercial Metals Treating, Inc., Toledo, O.
Cross Gear & Machine Co., 3250 Bellevue Ave., Detroit, Mich.
Milwaukee Metal Spinning Co., 3502 W. Pierce St., Milwaukee, Wis.
Nilson, A. H., Machine Co., Inc., Bridgeport, Conn.

CONTRACTORS—See ENGINEERS AND CONTRACTORS

CONTROL EQUIPMENT (Electric)

Allen-Bradley Co., 1316 S. Second St., Milwaukee, Wis.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City
Ward Leonard Electric Co., 65 South St., Mt. Vernon, N. Y.
Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.

CONTROL SYSTEMS (Automatic)

Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.

CONTROLS (Combustion)—See COMBUSTION CONTROLS

CONTROLS (Temperature)

Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
Ward Leonard Electric Co., 65 South St., Mt. Vernon, N. Y.
Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.

CONVEYING SYSTEMS (Steam Jet)

Hagan, George J., Co., 2400 E. Carson St., Pittsburgh, Pa.

CONVEYOR BELTS

Manheim Belting & Mfg. Co., Manheim, Pa.
United States Rubber Co., Mechanical Goods Div., 1230 Sixth Ave., New York City.

CONVEYOR BELTS (High & Low Temperature)

Cyclone Fence Div., American Steel & Wire Co., Waukegan, Ill.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

CONVEYOR BELTS (Wire)

Cyclone Fence Div., American Steel & Wire Co., Waukegan, Ill.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

CONVEYORS (Apron)

Lamson Corporation, ST-3, Lamson Ave., Syracuse, N. Y.
Link-Belt Co., 300 W. Pershing Rd., Road, Chicago, Ill.
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

CONVEYORS (Belt)

Diamond Iron Works, Inc., Minneapolis, Minn.
Lamson Corporation, ST-3, Lamson Ave., Syracuse, N. Y.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CONVEYORS (Chain)

American Brake Shoe Co., American Manganese Steel Div., 389 E. 14th St., Chicago, Ill.
Jeffrey Mfg. Co., 889-99 N. Fourth St., Columbus, O.
Lamson Corporation, ST-3, Lamson Ave., Syracuse, N. Y.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

CONVEYORS (Drag)

Lamson Corporation, ST-3, Lamson Ave., Syracuse, N. Y.

CONVEYORS (Elevating)

Diamond Iron Works, Inc., Minneapolis, Minn.
Farquhar, A. B., Co., Ltd., 195 Duke St., York, Pa.
Jeffrey Mfg. Co., 889-99 N. Fourth St., Columbus, O.
Link-Belt Co. 300 W. Pershing Rd., Chicago, Ill.
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

CONVEYORS (Overhead)

Lamson Corporation, ST-3, Lamson Ave., Syracuse, N. Y.

CONVEYORS (Overhead Trolley)

American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Lamson Corporation, ST-3, Lamson Ave., Syracuse, N. Y.
Link-Belt Co., 2410 W. 18th St., Chicago, Ill.
Reading Chain & Block Corp., 2102 Adams St., Reading, Pa.

CONVEYORS (Pneumatic)

Mahon, The R. C., Co., 8650 Mt. Elliott Ave., Detroit, Mich.
Lamson Corporation, ST-3, Lamson Ave., Syracuse, N. Y.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

CONVEYORS (Portable)

Lamson Corporation, ST-3, Lamson Ave., Syracuse, N. Y.
Jeffrey Mfg. Co., 889-99 N. Fourth St., Columbus, O.

CONVEYORS (Roller—Power and Gravity)

Lamson Corporation, ST-3, Lamson Ave., Syracuse, N. Y.
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.

CONVEYORS (Slat)

Lamson Corporation, ST-3, Lamson Ave., Syracuse, N. Y.

CONVEYORS (Vibrating)

Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Lamson Corporation, ST-3, Lamson Ave., Syracuse, N. Y.
Syntron Co., Homer City, Pa.

COOLERS (Liquid)

Ross Heater & Mfg. Co., 1407 West Ave., Buffalo, N. Y.

COPPER—See BRASS, BRONZE, COPPER, PHOSPHOR BRONZE

COPPER (Phosphorized)

Ajax Metal Co., Philadelphia, Pa.
American Brass Co., The, 25 Broadway, New York City.
Revere Copper & Brass, Inc. 230 Park Ave., New York City.
Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.

CORE WASH

Acheson Colloids Corp., Port Huron, Mich.
United States Graphite Co., The, Saginaw, Mich.

COTTER PINS

American Chain Div., American Chain & Cable Co., Inc., York, Pa.
Hindley Mfg. Co., Valley Falls, R. I.
Hubbard M. D., Spring Co., 707 Central Ave., Pontiac, Mich.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.

COUNTERBORES

Eclipse Counterbore Co., 7410 St. Aubin Ave., Detroit, Mich.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Genesee Tool Co., Fenton, Mich.

COUNTING DEVICES

Veeder-Root, Inc., Hartford, Conn.

COUPLINGS (Air Hose)

Cleveland Pneumatic Tool Co., 3781 E. 77th St., Cleveland, O.
Hansen Manufacturing Co., The 1786 East 27th St., Cleveland, O.

COUPLINGS (Flexible)

Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
Foote Bros. Gear & Machine Co., 5301 S. Western Blvd., Chicago, Ill.
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1140 W. Monroe St., Chicago, Ill.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.
Lovejoy Flexible Coupling Co., 4973 W. Lake St., Chicago, Ill.
Medart Co., The, 3520 DeKalb St. St. Louis, Mo.
Philadelphia Gear Works, Erie Ave. & G. St., Philadelphia, Pa.
Poole Fdy. & Mach. Co., Woodberry St., Baltimore, Md.
Thomas Flexible Coupling Co., Warren, Pa.
Waldron, John, Corp., New Brunswick, N. J.
Westinghouse Electric & Mfg. Co., 200 McCandless Ave., Pittsburgh, Pa.

COUPLINGS (Pipe)

Bethlehem Steel Co., Bethlehem, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Oil Well Supply Co., Dallas, Texas.
Republic Steel Corp., Dept. ST, Cleveland, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

CRANES (Charging)

Alliance Machine Co., The, Alliance, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Crawler, Erection)

Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Hughes-Keenan Co., 585 Newman St., Mansfield, O.
Industrial Brownhoist Corp., Bay City, Mich.
Link-Belt Speeder Corp., 301 W. Pershing Rd., Chicago, Ill.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.
Osgood Co., The, Marion, O.

CRANES (Electric)

Alliance Machine Co., The, Alliance, O.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Chicago Tramrail Co., 2910 W. Carroll Ave., Chicago, Ill.
Cleveland Crane & Engineering Co., The, 1125 E. 283rd St., Wickliffe, O.
Euclid Crane & Hoist Co., The, 1365 Chardon Rd., Euclid, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.

CRANES (Electric)—Cont.

Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Morgan Engineering Co., The, Alliance, O.
Reading Chain & Block Corp., 2102 Adams St., Reading, Pa.
Shepard Niles Crane & Hoist Corp. 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Gantry)

Alliance Machine Co., The, Alliance, O.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Crane & Engineering Co., The, 1125 E. 283rd St., Wickliffe, O.
Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago, Ill.
Euclid Crane & Hoist Co., The, 1365 Chardon Rd., Euclid, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.
Reading Chain & Block Corp., 2102 Adams St., Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Gasoline and Diesel)

Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

CRANES (Hand)

American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Chicago Tramrail Co., 2910 W. Carroll Ave., Chicago, Ill.
Cleveland Crane & Engineering Co., The, 1125 E. 283rd St., Wickliffe, O.
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Curtis Pneumatic Machinery Div. of Curtis Mfg. Co., 1996 Kienlen Ave., St. Louis, Mo.
Euclid Crane & Hoist Co., The, 1365 Chardon Rd., Euclid, O.
Hill Acme Co., 6400 Breakwater Ave., Cleveland, O.
Industrial Brownhoist Corp., Bay City, Mich.
Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Reading Chain & Block Corp., 2102 Adams St., Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.

CRANES (Jib)

Alliance Machine Co., The, Alliance, O.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Chicago Tramrail Co., 2910 W. Carroll Ave., Chicago, Ill.
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Euclid Crane & Hoist Co., The, 1365 Chardon Rd., Euclid, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Link-Belt Speeder Corp., 301 W. Pershing Rd., Chicago, Ill.
Morgan Engineering Co., The Alliance, O.
Reading Chain & Block Corp., 2102 Adams St., Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co. Inc., York, Pa.

CRANES (Locomotive)

Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.
Osgood Co., The, Marion, O.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

CRANES (Monorail)

American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Chicago Tramrail Co., 2910 W. Carroll Ave., Chicago, Ill.
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Euclid Crane & Hoist Co., The, 1365 Chardon Rd., Euclid, O.
Reading Chain & Block Corp., 2102 Adams St., Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Portable Electric)

Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.

CRANES (Traveling)

American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Chicago Tramrail Co., 2910 W. Carroll Ave., Chicago, Ill.
Euclid Crane & Hoist Co., The, 1365 Chardon Rd., Euclid, O.
Reading Chain & Block Corp., 2102 Adams St., Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.

CRANES, BRIDGE (Ore and Coal Handling)

Alliance Machine Co., The Alliance, O.
Dravo Corp. (Engineering Works Div.), Neville Island, Pittsburgh, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.

CRANKSHAFTS

Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Kropp Forge Co., 5301 W. Roosevelt Rd., Chicago, Ill.
Ladish Drop Forge Co., Cudahy, Wis.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Ohio Crankshaft Co., The, 3800 Harvard Ave., Cleveland, O.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.

CRAYONS (Metal Marking)

American Crayon Co., Sandusky, O.
Helmer-Staley, Inc., 327 W. Huron St., Chicago, Ill.

CRUSHERS

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Pulverizer Co., 1539 Macklind Ave., St. Louis, Mo.
Diamond Iron Works, Inc., Minneapolis, Minn.
Gruendler Crusher & Pulverizer Co., 2915-17 N. Market St., St. Louis, Mo.
Jeffrey Mfg. Co., 889-99 N. Fourth St., Columbus, O.

CUSHIONS (Pneumatic)

Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

CUTTERS (Bar and Bar Products)

Porter, H. K., Inc., 401 Ashland St., Everett, Mass.

CUTTERS (Die Sinking & End Milling)

Brown & Sharpe Mfg. Co., Providence, R. I.
Tomkins-Johnson Co., The, Dept. S, 611 N. Mechanic St., Jackson, Mich.

CUTTERS (Thread Milling)

Detroit Tap & Tool Co., 8432 Butler St., Detroit, Mich.

CUTTERS (Wire and Cable)

Porter, H. K., Inc., 401 Ashland St., Everett, Mass.

CUTTING AND WELDING—See WELDING

CUTTING OILS—See OILS (Cutting)

CUTTING-OFF MACHINES (Abrasive)

Campbell, Andrew C., Div., American Chain & Cable Co., Inc., Bridgeport, Conn.
Delta Mfg. Co., The, 620 E. Vienna Ave., Milwaukee, Wis.
DeSanno, A. P., & Son Inc., 436 Wheatland St., Phoenixville, Pa.
Landis Machine Co., Waynesboro, Pa.

CUTTING-OFF MACHINES (Rotary)

Consolidated Machine Tool Corp., Winton & Blossom Rds., Rochester, N. Y.
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.
Taylor-Wilson Mfg. Co., 1200 Thomson Ave., McKees Rocks, Pa.
Yoder Co., The, 55 Walworth Ave., Cleveland, O.

CYANIDING

Commercial Metals Treating, Inc., 177 S. St. Clair St., Toledo, O.
Lakeside Steel Improvement Co., The, 5418 Lakeside Ave., Cleveland, O.

CYLINDERS (Air or Hydraulic)

Anker-Holth Mfg. Co.—Airgrip Chuck Div., 832 S. Michigan Ave., Chicago, Ill.
Curtis Pneumatic Machinery Div. of Curtis Mfg. Co., 1996 Kienlen Ave., St. Louis, Mo.
Denison Engineering Co., The, 1163 Dublin Rd., Columbus, O.
Galland-Henning Mfg. Co., 2747 S. 31st St., Milwaukee, Wis.
Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago, Ill.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Scaife Co., Ann St., Oakmont, Pa.
Tomkins-Johnson Co., The, Dept. S, 611 N. Mechanic St., Jackson, Mich.
Weatherhead Co., The, 300 E. 131st St., Cleveland, O.

CYLINDERS (Pressure)

Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Pressed Steel Tank Co., 1461 S. 66th St., Milwaukee, Wis.
Scaife Co., Ann St., Oakmont, Pa.

DEGREASERS

Detroit Rex Products Co., 13029 Hillview Ave., Detroit, Mich.
Oakite Products, Inc., 22 Thames St., New York City.
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Turco Products, Inc., 6135 S. Central Ave., Los Angeles, Cal.

DEMAGNETIZERS

Blanchard Machine Co., The, 64 State St., Cambridge, Mass.

DEODORANT (Plant Sanitation)

Oakite Products, Inc., 22 Thames St., New York City.

DEOXIDIZERS

Vanadium Corp. of America, 420 Lexington Ave., New York City.

DESCALING PROCESSES AND EQUIPMENT

Ajax Electric Co., Frankford Ave. at Delaware Ave., Philadelphia, Pa.
American Foundry Equipment Co., The, 509 S. Byrkit St., Mishawaka, Ind.
Bullard Co., The, Bridgeport, Conn.
Oakite Products, Inc., 22 Thames St., New York City.
Turco Products, Inc., 6135 S. Central Ave., Los Angeles, Calif.
Worthington Pump & Machinery Corp., Harrison, N. J.

DIAMOND POWDER

Smit, J. K., & Sons, Inc., 157 Chambers St., New York City.

DIAMOND WHEELS

Smit, J. K., & Sons, Inc., 157 Chambers St., New York City.

DIAMONDS (Wheel Dressing)

Diamond Tool Co., 933 E. 41st St., Chicago, Ill.

DIAMOND TOOLS (Wheel Dressing)

Smit, J. K., & Sons, Inc., 157 Chambers St., New York City.

DIE BLOCKS

American Shear Knife Co., P.O. Box 335, Homestead, Pa.
Ampco Metal, Inc., Dept. S-7, 3830 W. Burnham St., Milwaukee, Wis.
Bissett Steel Co., The, 945 E. 67th St., Cleveland, O.
Firth-Sterling Steel Company, McKeesport, Pa.
Heppenstall Co., Box S-12, 4620 Hatfield St., Pittsburgh, Pa.
Jessop Steel Co., 584 Green St., Washington, Pa.
Kropp Forge Co., 5301 W. Roosevelt Rd., Chicago, Ill.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

DIE CENTERS

Firth-Sterling Steel Company, McKeesport, Pa.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

DIE HEADS

Consolidated Machine Tool Corp., Winton & Blossom Rds., Rochester, N. Y.
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

DIE-SINKING MACHINES

Cincinnati Milling Machine Co., Cincinnati, O.

DIES (Forging)—See FORGING DIES

DIES (Punching, Stamping, Blanking)

Ace Mfg. Corp., 1201 East Erie St., Philadelphia, Pa.
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O.
Eliott Mfg. Co., Milford, Conn.
Ferracute Machine Co., Bridgeton, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Sheffield Corp., The, 721 Springfield St., Dayton, O.
Spriesch Tool & Mfg. Co., 22 Howard St., Buffalo, N. Y.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

DIES (Steel, Embossing)

Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.
Matthews, Jas. H., & Co., 3978 Forbes St., Pittsburgh, Pa.

DIES AND CHASERS (Threading)

Hill Acme Co., 6400 Breakwater Ave., Cleveland, O.
Landis Machine Co., Waynesboro, Pa.

DIFFERENTIALS

Fairfield Manufacturing Co., 303 S. Earl Ave., Lafayette, Ind.

DIPPING MACHINES (Monorail)

American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Crane & Engineering Co., The, 1125 E. 283rd St., Wickliffe, O.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

DISCS (Abrasive)
Abrasive Products Inc., S. Braintree, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Chicago Wheel & Manufacturing Co., Dept. ST-7, 1101 W. Monroe St., Chicago, Ill.
Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul, Minn.

DOLOMITE—FLUX AND REFRACTORIES
Baker, The J. E. Co., 114 N. George St., York, Pa.
Basic Refractories, Inc., Hanna Bldg., Cleveland, O.

DOORS & SHUTTERS (Steel, Wood Rolling—Service, Fire)
Kinnear Mfg. Co., 1780-1800 Fields Ave., Columbus, O.
Mahon, The R. C., Co., 8650 Mt. Elliott Ave., Detroit, Mich.

DRAFT GAGES (Indicating, Recording)
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

DRAGLINES (Crawler)
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

DRAW BENCHES
Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown, O.
Vaughn Machinery Co., Cuyahoga Falls, O.

DRESSERS (Grinding Wheel)
Carborundum Co., The, Niagara Falls, N. Y.
Chicago Wheel & Manufacturing Co., Dept. ST-7, 1101 W. Monroe St., Chicago, Ill.
Diamond Tool Co., 933 E. 41st St., Chicago, Ill.

DRILL HEADS
Cross Gear & Machine Co., 3250 Bellevue Ave., Detroit, Mich.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

DRILL RODS—See RODS (Drill)

DRILLING MACHINERY
Baker Bros., Inc., Post & Westlake Sts., Toledo, O.
Buffalo Forge Co., 158 Mortimer St., Buffalo, N. Y.
Cross Gear & Machine Co., 3250 Bellevue Ave., Detroit, Mich.
Delta Mfg. Co., The, 620 E. Vienna Ave., Milwaukee, Wis.
Fosdick Machine Tool Co., The, 1638 Blue Rock St., Cincinnati, O.

DRILLING MACHINES (Radial)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Fosdick Machine Tool Co., The, 1638 Blue Rock St., Cincinnati, O.
Walker-Turner Co., Inc., 5013 Berckman St., Plainfield, N. J.

DRILLING MACHINES (Vertical)
Baker Bros., Inc., Post & Westlake Sts., Toledo, O.
Barnes, W. F. and John, Co., Rockford, Ill.
Bryant Machinery & Engineering Co., 400 W. Madison St., Chicago, Ill.
Cleereman Machine Tool Co., Green Bay, Wis.
Consolidated Machine Tool Corp., Winton & Blossom Rds., Rochester, N. Y.
Cross Gear & Machine Co., 3250 Bellevue Ave., Detroit, Mich.
Delta Mfg. Co., The, 620 E. Vienna Ave., Milwaukee, Wis.
Fosdick Machine Tool Co., The, 1638 Blue Rock St., Cincinnati, O.
Walker-Turner Co., Inc., 5013 Berckman St., Plainfield, N. J.

DRILLS (Electric Portable)
Chicago Wheel & Manufacturing Co., Dept. ST-7, 1101 W. Monroe St., Chicago, Ill.
Graybar Electric Co., 420 Lexington Ave., New York City
Syntron Co., Homer City, Pa.

DRILLS (Pneumatic)
Cleveland Pneumatic Tool Co., 3781 E. 77th St., Cleveland, O.

DRILLS (Twist)—See TWIST DRILLS

DRIVES (Chain)
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.

DRIVES (Cut Herringbone Gear)
Foote Bros. Gear & Machine Co., 5301 S. Western Blvd., Chicago, Ill.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1140 W. Monroe St., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Philadelphia Gear Works, Erie Ave. & G Sts., Philadelphia, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Westinghouse Electric & Mfg. Co., 200 McCandless Ave., Pittsburgh, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

DRIVES (Multi-V-Belt)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Dodge Manufacturing Corp., Mishawaka, Ind.
Medart Co., The 3520 DeKalb St., St. Louis, Mo.
Worthington Pump & Machinery Corp., Harrison, N. J.

DRUMS (Steel)
Pressed Steel Tank Co., 1461 S. 66th St., Milwaukee, Wis.

DRY CLEANING EQUIPMENT
Detroit Rex Products Co., 13029 Hillview Ave., Detroit, Mich.

DRYERS (Compressed Air)
Ruemelin Mfg. Co., 3882 N. Palmer St., Milwaukee, Wis.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

DRYERS (Paint, Varnish, Enamel, Chemical)
Blaw-Knox Co., Blawnox, Pa.
Despatch Oven Co., 722 Central Ave., Minneapolis, Minn.
Industrial Oven Engineering Co., The, 11621 Detroit Ave., Cleveland, O.
Maehler, Paul, Co., The, 2208 W. Lake St., Chicago, Ill.
Mahon, The R. C., Co., 8650 Mt. Elliott Ave., Detroit, Mich.
Morrison Engineering Corp., 5005 Euclid Ave., Cleveland, O.
Struthers Wells Corp., Titusville, Pa.

DRYERS AND COOLERS (Rotary)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Industrial Oven Engineering Co., The, 11621 Detroit Ave., Cleveland, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Salem Engineering Co., 714 S. Broadway, Salem, O.

DUCTS (Acid Fume, Rubber Lined)
Johns-Manville Corp., 22 E. 40th St., New York City

DUPLICATORS (Machine Tool Attachments)
Turchan Follower Machine Co., 8255 Livernois Ave., Detroit, Mich.

DUST ARRESTING EQUIPMENT
American Air Filter Co., 443 Central Ave., Louisville, Ky.
American Foundry Equipment Co., The, 509 S. Byrkit St., Mishawaka, Ind.
Mahon, The R. C., Co., 8650 Mt. Elliott Ave., Detroit, Mich.
Pangborn Corp., Hagerstown, Md.
Ruemelin Mfg. Co., 3882 N. Palmer St., Milwaukee, Wis.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co., 1216 W. 58th St., Cleveland, O.

ECONOMIZERS
Babcock & Wilcox Co., The, 85 Liberty St., New York City.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

ELECTRICAL EQUIPMENT
Allen-Bradley Co., 1316 S. Second St., Milwaukee, Wis.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Anaconda Wire & Cable Co., 95 Broadway, New York City.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City.
Master Electric Co., The, 100 Davis Ave., Dayton, O.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Ward Leonard Electric Co., 65 South St., Mt. Vernon, N. Y.
Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.

ELECTRODES (Carbon and Graphite)
National Carbon Co., Inc., Electrode Sales Div., 30 E. 42nd St., New York City.

ELECTRODES (Hard Surfacing Welding)
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
Lincoln Electric Co., The, 12818 Coit Road, Cleveland, O.
Metal & Thermit Corp., 120 Broadway, New York City.
Page Steel & Wire Div., American Chain & Cable Co., Inc., Monessen, Pa.
Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.

ELECTRODES (Resistance Welding)
Mallory, P. R., & Co., 3029 E. Washington Ave., Indianapolis, Ind.
National Carbon Co., W. 117th St. & Madison Ave., Cleveland, O.

ELEVATING AND CONVEYING MACHINERY—See CONVEYORS

ENAMELS (Lacquer)
Egyptian Lacquer Mfg. Co., The, 1270 Sixth Ave., New York City.

ENGINEERS AND CONTRACTORS
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Hydropress, Inc., 570 Lexington Ave., New York City.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.
Mahon, The R. C., Co., 8650 Mt. Elliott Ave., Detroit, Mich.
Morgan Engineering Co., The, Alliance, O.
Wean Engineering Co. Inc., The, Warren, O.

ENGINEERS (Consulting)
Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown, O.
Easton Car & Construction Co., Easton, Pa.
Freyn Engineering Co., 310 S. Michigan Ave., Chicago, Ill.
Garrett, George K., Co., D & Tioga Sts., Philadelphia, Pa.
Koppers Co., Engineering and Construction Div., 300 Koppers Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.
Trundle Engineering Co., The, 1501 Euclid Ave., Cleveland, O.

ENGINEERS (Management)
Trundle Engineering Co., The, 1501 Euclid Ave., Cleveland, O.

ENGINES (Diesel)
Buda Co., The, Harvey, Ill.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.
Worthington Pump & Machinery Corp., Harrison, N. J.

ENGINES (Gas, Oil)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Buda Co., The, Harvey, Ill.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Wisconsin Motor Corp., Milwaukee, Wis.
Worthington Pump & Machinery Corp., Harrison, N. J.

ENGINES (Kerosene)
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.

ENGINES (Steam)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Oil Well Supply Co., Dallas, Texas.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

EVAPORATORS
Blaw-Knox Co., Blawnox, Pa.
Struthers Wells Corp., Titusville, Pa.

EXCAVATORS
Osgood Co., The, Marion, O.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

FABRICATION (Metal—Spun & Welded)
Milwaukee Metal Spinning Co., 3502 W. Pierce St., Milwaukee, Wis.

FABRICATORS (Structural)
Mahon, The R. C., Co., 8650 Mt. Elliott Ave., Detroit, Mich.

FANS (Crane Cab)
Perkins, B. F., & Son, Inc., Holyoke, Mass.

FANS (Exhaust Ventilating)
Buffalo Forge Co., 158 Mortimer St., Buffalo, N. Y.
General Electric Co., Sec. A 333-90, Appliance & Merchandising Dept., Bridgeport, Conn.
Graybar Electric Co., 420 Lexington Ave., New York City.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

FANS (Mechanical Draft)
Buffalo Forge Co., 158 Mortimer St., Buffalo, N. Y.
Despatch Oven Co., 722 Central Ave., Minneapolis, Minn.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

FANS (Portable)
Buffalo Forge Co., 158 Mortimer St., Buffalo, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City.
Perkins, B. F., & Son, Inc., Holyoke, Mass.

FANS (Wall)
Graybar Electric Co., 420 Lexington Ave., New York City.
Perkins, B. F., & Son, Inc., Holyoke, Mass.

FENCE (Chain Link)
Continental Steel Corp., Kokomo, Ind.
Cyclone Fence Div., American Steel & Wire Co., Waukegan, Ill.
Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh, Pa.
Page Steel & Wire Div. American Chain & Cable Co., Inc., Monessen, Pa.

FENCING (Wire)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.

FENCING (Wire)—Cont.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Keystone Steel & Wire Co., Dept. A.C., Peoria, Ill.
Page Steel & Wire Div American Chain & Cable Co., Inc., Monessen, Pa.
Republic Steel Corp., Dept. ST. Cleveland, Ohio.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

FERROALLOY BRIQUETS
Electro Metallurgical Co., 30 E. 42nd St., New York City.

FERROALLOYS
Cleveland-Cliffs Iron Co., The, Union Commerce Bldg., Cleveland, O.
Electro Metallurgical Co., 30 E. 42nd St., New York City.
International Nickel Co., Inc., The, 67 Wall St., New York City.
Metal & Thermit Corp., 120 Broadway, New York City.
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERRO BORON
Molybdenum Corp. of America, Grant Bldg., Pittsburgh, Pa.

FERROCHROME
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROMANGANESE
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Samuel, Frank & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FERRO MOLYBDENUM
Climax Molybdenum Co., 500 Fifth Ave., New York City.
Molybdenum Corp. of America, Grant Bldg., Pittsburgh, Pa.

FERROPHOSPHORUS
Samuel, Frank & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FERROSILICON
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Southern Ferro Alloys Co., 2108 Chestnut St., Chattanooga, Tenn.
Vanadium Corp. of America, 420 Lexington Ave., New York City.
Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.

FERROSILICON ALUMINUM
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROTITANIUM
Metal & Thermit Corp., 120 Broadway, New York City.
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERRO TUNGSTEN
Molybdenum Corp. of America, Grant Bldg., Pittsburgh, Pa.

FERROVANADIUM
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FILES AND RASPS
Atkins, E. C., & Co., 427 S. Illinois St., Indianapolis, Ind.
Disston, Henry, & Sons, Inc., 726 Tacony, Philadelphia, Pa.
Simonds Saw & Steel Co., 1350 Columbia Rd., Boston, Mass.

FILES (Band-Metal Cutting)
Continental Machines, Inc., 1324 Washington Ave., Minneapolis, Minn.

FILTERS (Air)—See CLEANERS AND FILTERS (Air)

FILTERS (Acid)
Adams, R. P., Co., Inc., 75 Chicago St., Buffalo, N. Y.

FILTERS (Air-Engine)
Donaldson Co., 666 Pelham St., St. Paul, Minn.

FINISH, BLACK OXIDE (Chemicals for)
Alrose Chemical Co., 180 Mill St., Providence, R. I.

FINISHES (Machinery)
Egyptian Lacquer Co., The, 1270 Sixth Ave., New York City.

FINISHING EQUIPMENT (Painting, and Drying)
Mahon, The R. C., Co., 8650 Mt. Elliott Ave., Detroit, Mich.

FIRE BRICK—See BRICK

FIRE BRICK (Insulating)
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Johns-Manville Corp., 22 E. 40th St., New York City.
Laclede-Christy Clay Products Co., Ambassador Bldg., St. Louis, Mo.

FIRE CLAY—See REFRACTORIES

FIRE DOORS & SHUTTERS—See DOORS & SHUTTERS

FIRE EXTINGUISHERS
Cardox Corp., 307 N. Michigan Ave., Chicago, Ill.
Kidde, Walter, & Co., Inc., 747 Main St., Belleville, N. J.

FIRE EXTINGUISHING SYSTEMS
Cardox Corp., 307 N. Michigan Ave., Chicago, Ill.
Kidde, Walter, & Co., Inc., 747 Main St., Belleville, N. J.

FITTINGS (Malleable and Cast Iron)
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Flori Pipe Co., The, Red Bud and Bulwer Ave., St. Louis, Mo.

FLAME HARDENING
Air Reduction, 60 E. 42nd St., New York City.
Commercial Metals Treating, Inc., 177 S. St. Clair St., Toledo, O.
Kaydon Engineering Co., The, Muskegon, Mich.
Linde Air Products Co., 30 E. 42nd St., New York City.

FLANGES (Cast Steel)
Commercial Metals Treating, Inc., 177 S. St. Clair St., Toledo, O.

FLANGES (Forged Steel)
Commercial Metals Treating, Inc., 177 S. St. Clair St., Toledo, O.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Flori Pipe Co., The, Red Bud and Bulwer Ave., St. Louis, Mo.
Kropp Forge Co., 5301 W. Roosevelt Rd., Chicago, Ill.
Ladish Drop Forge Co., Cudahy, Wis.
Steel Improvement & Forge Co., 950 E. 64th St., Cleveland, O.

FLANGES (Welded Steel)
Flori Pipe Co., The, Red Bud and Bulwer Ave., St. Louis, Mo.
King Fifth Wheel Co., 2915 N. Second St., Philadelphia, Pa.

FLOOD LIGHTS
U. C. Lite Mfg. Company. 11 East Hubbard Street, Chicago, Ill.

FLOORING (Monolithic)
Johns-Manville Corp., 22 E. 40th St., New York City.

FLOORING (Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Blaw-Knox Co., Blawnox, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Hendrick Mfg. Co., Carbondale, Pa.
Howard Foundry Co., 4900 Bloomingdale Ave., Chicago, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Smith, David, Steel Co., Inc., 234—46th St., Brooklyn, N. Y.
Tri-Lok Co., 5515 Butler St., Pittsburgh, Pa.
United States Steel Supply Co., 1316 Wabansia Ave., Chicago, Ill.

FLUE DUST CONDITIONERS
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

FLUE GAS ANALYZERS
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

FLUORSPAR
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FLUXES (Soldering, Welding & Tinning)
American Chemical Paint Co., Ambler, Pa.
Eutectic Welding Alloys, Inc., 40 Worth St., New York City
Kester Solder Co., 4222 Wrightwood Ave., Chicago, Ill.
Linde Air Products Co., The, 30 E. 42nd St., New York City.

FORGING DIES
Kropp Forge Co., 5301 W. Roosevelt, Rd., Chicago, Ill.
Steel Improvement & Forge Co., 950 E. 64th St., Cleveland, O.

FORGING MACHINERY
Alliance Machine Co., The, Alliance, O.
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Erie Foundry Co., Erie, Pa.
Hill Acme Co., 6400 Breakwater Ave., Cleveland, O.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
National Machinery Co., The, Tiffin, O.

FORGINGS (Aluminum, Brass, Bronze, Copper)
Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
American Brass Co., The, 25 Broadway, New York City.
Ampco Metal, Inc., Dept. S-7, 3830 W. Burnham St., Milwaukee, Wis.
Bohn Aluminum & Brass Corp., Lafayette Bldg., Detroit, Mich.
Mueller Brass Co., Port Huron, Mich.
Steel Improvement & Forge Co., 950 E. 64th St., Cleveland, O.
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

FORGINGS (Drop) (*Also Stainless)
American Brake Shoe Co., American Forge Div., 332 S. Michigan Ave., Chicago, Ill.
*Atlas Drop Forge Co., Lansing, Mich.
*Bethlehem Steel Co., Bethlehem, Pa.
Davenport-Besler Corp., Davenport, Iowa
Kropp Forge Co., 5301 W. Roosevelt Rd., Chicago, Ill.
Ladish Drop Forge Co., Cudahy, Wis.
Oil Well Supply Co., Dallas, Texas.
Oliver Iron & Steel Corp., S. 10th & Muriel Sts., Pittsburgh, Pa.
Steel Improvement & Forge Co., 950 E. 64th St., Cleveland, O.

FORGINGS (Hollow Bored)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Atlas Drop Forge Co., Lansing, Mich.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Commercial Forgings Co., The, 3700 E. 91st St., Cleveland, O.
Kropp Forge Co., 5301 W. Roosevelt Rd., Chicago, Ill.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Steel Improvement & Forge Co., 950 E. 64th St., Cleveland, O.

FORGINGS (Iron and Steel) (*Also Stainless)
*Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Brake Shoe Co., American Forge Div., 332 S. Michigan Ave., Chicago, Ill.
*Atlas Drop Forge Co., Lansing, Mich.
*Barium Stainless Steel Corp., Canton, O.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Commercial Forgings Co., The, 3700 E. 91st St., Cleveland, O.
Heppenstall Co., Box S-12, 4620 Hatfield St., Pittsburgh, Pa.
*Kropp Forge Co., 5301 W. Roosevelt Rd., Chicago, Ill.
Ladish Drop Forge Co., Cudahy, Wis.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
Oil Well Supply Co., Dallas, Texas.
Oliver Iron & Steel Corp., S. 10th & Muriel Sts., Pittsburgh, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Steel Improvement & Forge Co., 950 E. 64th St., Cleveland, O.
Struthers Wells Corp., Titusville, Pa.
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

FORGINGS (Machined)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Kropp Forge Co., 5301 W. Roosevelt Rd., Chicago, Ill.
Steel Improvement & Forge Co., 950 E. 64th St., Cleveland, O.

FORGINGS (Press)
Ladish Drop Forge Co., Cudahy, Wis.
Steel Improvement & Forge Co., 950 E. 64th St., Cleveland, O.

FORGINGS (Small)
Kropp Forge Co., 5301 W. Roosevelt Rd., Chicago, Ill.
Oliver Iron & Steel Corp., S. 10th & Muriel Sts., Pittsburgh, Pa.
Steel Improvement & Forge Co., 950 E. 64th St., Cleveland, O.

FORGINGS (Upset)
American Brake Shoe Co., American Forge Div., 332 S. Michigan Ave., Chicago, Ill.
American Metal Products Co., 5959 Linsdale Ave., Detroit, Mich.
Atlas Drop Forge Co., Lansing, Mich.
Bethlehem Steel Co., Bethlehem, Pa.
Kropp Forge Co., 5301 W. Roosevelt Rd., Chicago, Ill.
Ladish Drop Forge Co., Cudahy, Wis.
Oliver Iron & Steel Corp., S. 10th & Muriel Sts., Pittsburgh, Pa.
Standard Tube Co., The, 14600 Woodward Ave., Detroit, Mich.
Steel Improvement & Forge Co., 950 E. 64th St., Cleveland, O.

FOUNDRY EQUIPMENT
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
American Foundry Equipment Co., The, 509 S. Byrkit St., Mishawaka, Ind.
Delta Mfg. Co., The, 620 E. Vienna Ave., Milwaukee, Wis.
Howard Eng. & Mfg. Co., The, 1052 Hulbert Ave., Cincinnati, 14, O.
Industrial Oven Engineering Co., The, 11621 Detroit Ave., Cleveland, O.
Jeffrey Mfg. Co., 889-99 N. Fourth St., Columbus, O.

FOUNDRY EQUIPMENT—Cont.

Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Mahon, The R. C., Co., 8650 Mt. Elliott Ave., Detroit, Mich.
Mahr Mfg. Co., 1702 N. Second St., Minneapolis, Minn.
Pangborn Corporation, Hagerstown, Md.
Ransohoff, N., Inc., 1317 Township Ave., Cincinnati, O.

FOUNDRY SUPPLIES

Acheson Colloids Corp., Port Huron, Mich.

FROGS AND SWITCHES

American Brake Shoe Co., Ramapo Ajax Div., 230 Park Ave., New York City.
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.

FURNACE EQUIPMENT (Water Cooled)

Blaw-Knox Co., Blawnox, Pa.

FURNACE INSULATION—See INSULATION

FURNACES (Brazing)

Ajax Electric Co., Frankford Ave., at Delaware Ave., Philadelphia, Pa.
Electric Furnace Co., The, Salem, O.
Firth-Sterling Steel Co., McKeesport, Pa.
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
Hevi Duty Electric Co., 4212 W. Highland Blvd., Milwaukee, Wis.
Lepel High Frequency Laboratories, Inc., 39 W. 60th St., N. Y., N. Y.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.

FURNACES (Electric Heating)

Ajax Electric Co., Frankford Ave., at Delaware Ave., Philadelphia, Pa.
Electric Furnace Co., The, Salem, O.
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hevi Duty Electric Co., 4212 W. Highland Blvd., Milwaukee, Wis.
Hydro-Arc Furnace Corp., 561 Hillgrove Ave., LaGrange, Ill.
Lepel High Frenquency Laboratories, Inc., 39 W. 60th St., N. Y., N. Y.
Mahr Mfg. Co., 1702 N. Second St., Minneapolis, Minn.
Morrison Engineering Corp., 5005 Euclid Ave., Cleveland, O.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1257, Pittsburgh, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.

FURNACES (Electric Melting)

Ajax Engineering Corp., Trenton, N. J.
Ajax Electric Furnace Corp., 1108 Frankford Ave., Philadelphia, Pa.
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Detroit Electric Furnace Div., Kuhlman Electric Co., Bay City, Mich.
Hydro-Arc Furnace Corp., 561 Hillgrove Ave., LaGrange, Ill.
Lepel High Frequency Laboratories, Inc., 39 W. 60th St., N. Y., N. Y.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1257, Pittsburgh, Pa.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.

FURNACES (Enameling)

Electric Furnace Co., The, Salem, O.
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
Hagan, George J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Industrial Oven Engineering Co., The, 11621 Detroit Ave., Cleveland, O.
Maehler, Paul, Co., The, 2208 W. Lake St., Chicago, Ill.

FURNACES (Forging)

Ajax Electric Co., Frankford Ave. at Delaware Ave., Philadelphia, Pa.
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Industrial Oven Engineering Co., The, 11621 Detroit Ave., Cleveland, O.
Lepel High Frequency Laboratories, Inc., 39 W. 60th St., N. Y., N. Y.
Mahr Mfg. Co., 1702 N. Second St., Minneapolis, Minn.
Morrison Engineering Corp., 5005 Euclid Ave., Cleveland, O.
R-S Products Corp., 132 Berkley St., Philadelphia, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Surface Combustion Div. of General Properties Co., Inc., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Wilson, Lee, Engineering Co., 20005 Lake Rd., Cleveland, O.

FURNACES (Galvanizing)

General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
Mahr Mfg. Co., 1702 N. Second St., Minneapolis, Minn.
Morrison Engineering Corp., 5005 Euclid Ave., Cleveland, O.
Salem Engineering Co., 714 S. Broadway, Salem, O.

FURNACES (Gas or Oil)

Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Industrial Oven Engineering Co., The, 11621 Detroit Ave., Cleveland, O.
Johnson Gas Appliance Co., 591 "E" Ave., N.W., Cedar Rapids, Iowa
Mahr Mfg. Co., 1702 N. Second St., Minneapolis, Minn.
Morrison Engineering Corp., 5005 Euclid Ave., Cleveland, O.
R-S Products Corp., 132 Berkley St., Philadelphia, Pa
Salem Engineering Co., 714 S. Broadway, Salem, O.
Surface Combustion Div. of General Properties Co., Inc., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.

FURNACES (Heat Treating, Annealing, Carburizing, Hardening, Tempering)

Ajax Electric Co., Frankford Ave. at Delaware Ave., Philadelphia, Pa.
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Despatch Oven Co., 722 Central Ave., Minneapolis, Minn.
Electric Furnace Co., The, Salem, O.
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hevi Duty Electric Co., 4212 W. Highland Blvd., Milwaukee, Wis.
Holden, A. F., Co., The, 200 Winchester Ave., New Haven, Conn.
Industrial Oven Engineering Co., The, 11621 Detroit Ave., Cleveland, O.
Johnson Gas Appliance Co., 591 "E" Ave., N.W., Cedar Rapids, Iowa
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
Lepel High Frequency Laboratories, Inc., 39 W. 60th St., N. Y., N. Y.
Maehler, Paul, Co., The, 2208 W. Lake St., Chicago, Ill.
Morrison Engineering Corp., 5005 Euclid Ave., Cleveland, O.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
R-S Products Corp., 132 Berkley St., Philadelphia, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Surface Combustion Div. of General Properties Co., Inc., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Wean Engineering Co., Inc., The, Warren, O.
Wellman Engineering Co., The 7016 Central Ave., Cleveland, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.
Wilson, Lee, Engineering Co., 20005 Lake Rd., Cleveland, O.

FURNACES (Induction Melting)

Ajax Electric Furnace Corp., 1103 Frankford Ave., Philadelphia, Pa.
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Ajax Engineering Corp., Trenton, N. J.

FURNACES (Laboratory)

Despatch Oven Co., 722 Central Ave., Minneapolis, Minn.
Dietert, Harry W., Co., 9330J Roselawn Ave., Detroit, Mich.
Hevi Duty Electric Co., 4212 W. Highland Blvd., Milwaukee, Wis.
Johnson Gas Appliance Co., 591 "E" Ave., N.W., Cedar Rapids, Iowa
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
Lepel High Frequency Laboratories, Inc., 39 W. 60th St., N. Y., N. Y.
Mahr Mfg. Co., 1702 N. Second St., Minneapolis, Minn.

FURNACES (Nonferrous Melting)

Ajax Electric Furnace Corp., 1108 Frankford Ave., Philadelphia, Pa.
Ajax Engineering Corp., Trenton, N. J.
Detroit Electric Furnace Div., Kuhlman Electric Co., Bay City, Mich.
Lepel High Frequency Laboratories, Inc., 39 W. 60th St., N. Y., N. Y.
Salem Engineering Co., 714 S. Broadway, Salem, O.

FURNACES (Open Hearth)

Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Blaw-Knox Co., Blawnox, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Wellman Engineering Co., 7016 Central Ave., Cleveland, O.

FURNACES (Portable)

Hagan, George J., Co., 2400 E. Carson St., Pittsburgh, Pa.

FURNACES (Recuperative)

Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Surface Combustion Div. of General Properties Co., Inc., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.

FURNACES (Rivet Heating)

Ajax Electric Co., Frankford Ave. at Delaware Ave., Philadelphia, Pa.
Lepel High Frequency Laboratories, Inc. 39 W. 60th St., N. Y., N. Y.
Mahr Mfg. Co., 1702 N. Second St., Minneapolis, Minn.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Surface Combustion Div. of General Properties Co., Inc., 2375 Dorr St., Toledo, O.

FURNACES (Sheet and Tin Mill)

Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Surface Combustion Div. of General Properties Co., Inc., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Wean Engineering Co., Inc., The, Warren, O.
Wilson, Lee, Engineering Co., 20005 Lake Rd., Cleveland, O.

FURNACES (Steel Mill)

Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Surface Combustion Div. of General Properties Co., Inc., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Wean Engineering Co., Inc., The, Warren, O.
Wilson, Lee, Engineering Co., 20005 Lake Rd., Cleveland, O.

FURNACES (Welding)

Despatch Oven Co., 722 Central Ave., Minneapolis, Minn.
Hagan, George J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Industrial Oven Engineering Co., The, 11621 Detroit Ave., Cleveland, O.
Mahr Mfg. Co., 1702 N. Second St., Minneapolis, Minn.

GAGE BLOCKS

Continental Machines, Inc., 1324 Washington Ave., Minneapolis, Minn.
Savage Tool Co., Savage, Minn.

GAGES

Ace Mfg. Corp., 1201 East Erie St., Philadelphia, Pa.
Brown & Sharpe Mfg. Co., Providence, R. I.
Firth-Sterling Steel Co., McKeesport, Pa.
Greenfield Tap & Die Corp., Greenfield, Mass.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.
Scherr, George, Co., 128 Lafayette St., New York City
Sheffield Corp., The, 721 Springfield St., Dayton, O.
Turner Gage Grinding Co., 2630 Hilton Rd., Ferndale, Mich.

GAGES (Automatic Control & Recording)

Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
Sheffield Corp., The, 721 Springfield St., Dayton, O.

GAGES (Indicating and Recording)

Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
Sheffield Corp., The, 721 Springfield St., Dayton, O.
Westinghouse Electric & Mfg. Co., Orange Ave., Newark, N. J.

GAGES (Pressure & Vacuum Recording)

Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

GAGES (Thread-Ring & Plug)

Detroit Tap & Tool Co., 8432 Butler St., Detroit, Mich.
Sheffield Corp., The, 721 Springfield St., Dayton, O.
Turner Gage Grinding Co., 2630 Hilton Rd., Ferndale, Mich.

GALVANIZING (Hot Dip)

Acme Galvanizing, Inc., Milwaukee, Wis.
Acme Steel & Malleable Iron Works, Buffalo, N. Y.
American Hot Dip Galvanizers Assoc., Inc., American Bank Bldg., Pittsburgh, Pa.

GALVANIZING (Hot Dip)—Cont.

American Tinning & Galvanizing Co., Erie, Pa.
Atlantic Stamping Co., Rochester, N. Y.
Atlantic Steel Co., Atlanta, Ga.
Buffalo Galvanizing & Tinning Works, Inc., Buffalo, N. Y.
Cattie, Jos. P., & Bros., Gaul and Liberty Sts., Philadelphia, Pa.
Columbian Steel Tank Co., Kansas City, Mo.
Commercial Metals Treating, Inc., 177 S. St. Clair, Toledo, Ohio.
Diamond Expansion Bolt Co., Inc., Garwood, N. J.
Emsco Derrick & Equipment Co., Los Angeles, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Equipment Steel Products Div. of Union Asbestos and Rubber Co., Blue Island, Ill.
Fanner Mfg. Co., The, Cleveland, O.
Finn, John, Metal Works, San Francisco, Calif.
Galvanizers Incorporated, Portland, Ore.
Gregory, Thomas, Galvanizing Works, Maspeth, N. Y.
Hanlon-Gregory Galvanizing Co., 3515 Butler St., Pittsburgh, Pa.
Hill, James Mfg. Co., Providence, R. I.
Hubbard & Co., Oakland, Calif.
Independent Galvanizing Co., Newark, N. J.
International-Stacey Corp., Columbus, O.
Isaacon Iron Works, Seattle, Wash.
Joslyn Co. of California, Los Angeles, Calif.
Joslyn Mfg. & Supply Co., Chicago, Ill.
Koven, L. O., & Bro., Inc., Jersey City, N. J.
Laughlin, Thomas, Co., Portland, Maine
Lehigh Structural Steel Co., Allentown, Pa.
Lewis Bolt & Nut Co., Minneapolis, Minn.
Los Angeles Galvanizing Co., Huntington Park, Calif.
Missouri Rolling Mill Corp., St. Louis, Mo.
National Telephone Supply Co., The, Cleveland, O.
Oliver Iron & Steel Corp., S. 10th & Muriel Sts., Pittsburgh, Pa.
Penn Galvanizing Co., Philadelphia, Pa.
Riverside Foundry & Galvanizing Co., Kalamazoo, Mich.
San Francisco Galvanizing Works, San Francisco, Calif.
Sanitary Tinning Co., The, Cleveland, O.
Scaife Co., Ann St., Oakmont, Pa.
Southern Galvanizing Co., Baltimore, Md.
Standard Galvanizing Co., Chicago, Ill.
Western Galvanizing Co., Los Angeles, Calif.
Wilcox, Crittenden & Co., Inc., Middletown, Conn.
Witt Cornice Co., The, Cincinnati, O.

GALVANIZING PLANTS FOR SHEETS

Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown, O.
Erie Foundry Co., Erie, Pa.
Wean Engineering Co., Inc., The, Warren, O.

GALVANIZING PRODUCTS

Commercial Metals Treating, Inc., 177 S. St. Clair St., Toledo, O.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.

GAS HOLDERS

Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.

GAS PRODUCER PLANTS

Koppers Co., Engineering and Construction Div., 300 Koppers Bldg., Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

GAS RECOVERY COKE OVENS AND GAS PLANTS

Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Koppers Co., Engineering and Construction Div., 300 Koppers Bldg., Pittsburgh, Pa.

GAS SCRUBBERS AND WASHERS

Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Blaw-Knox Co., Blawnox, Pa.
Buffalo Forge Co., 158 Mortimer St., Buffalo, N. Y.

GASKETS (Asbestos, Metal or Rubber)

Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.
National Lead Co., 111 Broadway, New York City
Steel Improvement & Forge Co., 950 E. 64th St., Cleveland, O.

GEAR BLANKS

American Brake Shoe Co., American Forge Div., 332 S. Michigan Ave., Chicago, Ill.
Ampco Metal, Inc., Dept. S-7 3830 W. Burnham St., Milwaukee, Wis.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Commercial Forgings Co., The, 3700 E. 91st St., Cleveland, O.
Farrell-Cheek Steel Co., Sandusky, O.
Foote Bros. Gear & Machine Co., 5301 S. Western Blvd., Chicago, Ill.
King Fifth Wheel Co., 2915 N. Second St., Philadelphia, Pa.
Ladish Drop Forge Co., Cudahy, Wis.
Medart Co., The, 3520 DeKalb St., St. Louis, Mo.
Philadelphia Gear Works, Erie Ave. & G St., Philadelphia, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Union Steel Casting Div., Blaw-Knox Co., 62nd & Butler Sts., Pittsburgh, Pa.
Waldron, John, Corp., New Brunswick, N. J.

GEAR MACHINERY (Generating)

Cross Gear & Machine Co., 3250 Bellevue Ave., Detroit, Mich.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.

GEAR MACHINERY (Lapping, Finishing, Checking)

Cross Gear & Machine Co., 3250 Bellevue Ave., Detroit, Mich.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
Sheffield Corp., The, 721 Springfield St., Dayton, O.

GEARS (Non-Metallic)

Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
James, D. O., Mfg. Co., 1140 W. Monroe St., Chicago, Ill.
Medart Co., The, 3520 DeKalb St., St. Louis, Mo.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.
Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.

GEARS (Steel Laminated)

Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.
Waldron, John, Corp., New Brunswick, N. J.

GEARS (Worm)

Cleveland Worm & Gear Co., 3270 E. 80th St., Cleveland, O.
Fairfield Manufacturing Co., 303 S. Earl Ave., Lafayette, Ind.
Foote Bros. Gear & Machine Co., 5301 S. Western Blvd., Chicago, Ill.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1140 W. Monroe St., Chicago, Ill.
Medart Co., The, 3520 DeKalb St., St. Louis, Mo.
Philadelphia Gear Works, Erie Ave. & G Sts., Philadelphia, Pa.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.

GEARS AND GEAR CUTTING

Dodge Manufacturing Corp., Mishawaka, Ind.
Fairfield Manufacturing Co., 303 S. Earl Ave., Lafayette, Ind.
Foote, Brad, Gear Works, Cicero, Ill.
Foote Bros. Gear & Machine Co., 5301 S. Western Blvd., Chicago, Ill.
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
Grant Gear Works, 2nd & B Sts., Boston, Mass.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1140 W. Monroe St., Chicago, Ill.
Jones, W. A., Fdry. & Mach. Co., 4437 Roosevelt Rd., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Medart Co., The, 3520 DeKalb St., St. Louis, Mo.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
Philadelphia Gear Works, Erie Ave. & G St., Philadelphia, Pa.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.
Simonds Gear & Mfg. Co., 25th St., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Westinghouse Electric & Mfg. Co., 200 McCandless Ave., Pittsburgh, Pa.

GENERATING SETS

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Buda Co., The, Harvey, Ill.
Century Electric Co., 1806 Pine St., St. Louis, Mo.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Master Electric Co., The, 100 Davis Ave., Dayton, O.
Ready-Power Co., The, 3842 Grand River Ave., Detroit, Mich.
Reliance Electric & Eng. Co., 1088 Ivanhoe Rd., Cleveland, O.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

GENERATORS (Acetylene—Portable and Stationary)

Linde Air Products Co., The, 30 E. 42nd St., New York City.

GENERATORS (Electric)

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Century Electric Co., 1806 Pine St., St. Louis, Mo.
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O.
Master Electric Co., The, 100 Davis Ave., Dayton, O.
Reliance Electric & Eng. Co., 1088 Ivanhoe Rd., Cleveland, O.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

GENERATORS (Plating)

Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

GRABS—FOR SHEETS, COILS, INGOTS

J-B Engineering Sales Co., 3100 East St., New Haven, Conn.

GRAPHITE

Acheson Colloids Corp., Port Huron, Mich.
National Carbon Co., W. 117th St. & Madison Ave., Cleveland, O.
United States Graphite Co., The, Saginaw, Mich.

GRAPHITE (Colloidal)

Acheson Colloids Corp., Port Huron, Mich.

GRATING

Blaw-Knox Co., Blawnox, Pa.
Dravo Corp., (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Hendrick Mfg. Co., Carbondale, Pa.
Tri-Lok Co., 5515 Butler St., Pittsburgh, Pa.

GREASE (Lubricating)—See LUBRICANTS (Industrial)

GREASE SEALS

Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.

GRILLS (Perforated Metal)

Hendrick Mfg. Co., Carbondale, Pa.

GRINDER ATTACHMENTS

Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Grinders, Incorporated, Cincinnati, Ohio
Cleveland Tool Engineering Co., The, 9114 Detroit Ave., Cleveland, O.
Delta Mfg. Co., The, 620 E. Vienna Ave., Milwaukee, Wis.
Fitchburg Grinding Machine Corp., Fitchburg, Mass.
Landis Machine Co., Waynesboro, Pa.

GRINDER CENTERS

Firth-Sterling Steel Company, McKeesport, Pa.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

GRINDER HEADS

Fitchburg Grinding Machine Corp., Fitchburg, Mass.

GRINDERS (Automotive Reconditioning)

Heald Machine Co., Worcester, Mass.

GRINDERS (Bench & Floor Type)

Delta Mfg. Co., The, 620 E. Vienna Ave., Milwaukee, Wis.
Walker-Turner Co., Inc., 5013 Berckman St., Plainfield, N. J.

GRINDERS (Centerless—Internal and External)

Cincinnati Grinders, Incorporated, Cincinnati, O.
Heald Machine Co., Worcester, Mass.

GRINDERS (Chucking)

Cross Gear & Machine Co., 3250 Bellevue Ave., Detroit, Mich.
Fitchburg Grinding Machine Corp., Fitchburg, Mass.
Heald Machine Co., Worcester, Mass.

GRINDERS (Circular Saw)

Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.

GRINDERS (Crank Pin, Cam, Piston, Valve Face)

Cincinnati Grinders Incorporated, Cincinnati, O.
Cross Gear & Machine Co., 3250 Bellevue Ave., Detroit, Mich.
Norton Co., Worcester, Mass.

GRINDERS (Cylindrical)

Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Grinders, Incorporated, Cincinnati, Ohio
Norton Co., Worcester, Mass.

GRINDERS (Die)
Fitchburg Grinding Machine Corp., Fitchburg, Mass.
Landis Machine Co., Waynesboro, Pa.

GRINDERS (Oscillating)
Cross Gear & Machine Co., 3250 Bellevue Ave., Detroit, Mich.

GRINDERS (Plain and Universal)
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Grinders, Incorporated, Cincinnati, O.
Delta Mfg. Co., The, 620 E. Vienna Ave., Milwaukee, Wis.
Fitchburg Grinding Machine Corp., Fitchburg, Mass.
LeBlond, R. K., Machine Tool Co., The, Dept. J-2, Cincinnati, O.
Norton Co., Worcester, Mass.

GRINDERS (Portable)
Chicago Wheel & Manufacturing Co., Dept. ST-7, 1101 W. Monroe St., Chicago, Ill.
Cleveland Pneumatic Tool Co., The, 3781 E. 77th St., Cleveland, O.
Graybar Electric Co., 420 Lexington Ave., New York City
Syntron Co., Homer City, Pa.

GRINDERS (Precision Thread)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Waynesboro, Pa.

GRINDERS (Roll)
Lewis Fdry. & Mach. Div. of Blaw-Knox Co., Pittsburgh, Pa.
Medart Co., The, 3520 DeKalb St., St. Louis, Mo.
Mesta Machine Co., P. O. Box 1466 Pittsburgh, Pa.
Norton Co., Worcester, Mass.
Yoder Co., The, 55 Walworth Ave., Cleveland, O.

GRINDERS (Sheet Steel & Internal Tube)
Mattison Machine Works, Rockford, Ill.

GRINDERS (Single Slide Internal)
Bryant Chucking Grinder Co., Springfield, Vt.

GRINDERS (Spline)
Cross Gear & Machine Co., 3250 Bellevue Ave., Detroit, Mich.
Fitchburg Grinding Machine Corp., Fitchburg, Mass.

GRINDERS (Surface)
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Continental Machines, Inc., 1324 Washington Ave., Minneapolis, Minn.
Delta Mfg. Co., The, 620 E. Vienna Ave., Milwaukee, Wis.
Heald Machine Co., Worcester, Mass.
Hill Acme Co., 6400 Breakwater Ave., Cleveland, O.
Mattison Machine Works, Rockford, Ill.
Norton Co., Worcester, Mass.
Savage Tool Co., Savage, Minn.

GRINDERS (Swing Frame)
Fox Grinders, Inc., Oliver Bldg., Pittsburgh, Pa.

GRINDERS (Tool and Cutter)
Brown & Sharpe Mfg. Co., Providence, R. I.
Carboloy Co., Inc., 11141 E. 8 Mile Rd., Detroit, Mich.
Cincinnati Milling Machine Co., Cincinnati, O.
Cleveland Tool Engineering Co., 9114 Detroit Ave., Cleveland, O.
Delta Mfg. Co., The, 620 E. Vienna Ave., Milwaukee, Wis.
Detroit Tap & Tool Co., 8432 Butler St., Detroit, Mich.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Fitchburg Grinding Machine Corp., Fitchburg, Mass.
Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago, Ill.
Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee, Wis.
LeBlond, R. K. Machine Tool Co., The, Dept. J-2, Cincinnati, O.
Norton Co., Worcester, Mass.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.
Sellers, William, & Co., Inc., 16th & Callowhill Sts., Philadelphia, Pa.

GRINDING (Shear Knife)
American Shear Knife Co., P.O. Box 355, Homestead, Pa.
Hill Acme Co., 6400 Breakwater Ave., Cleveland, O.

GRINDING MACHINES (Gear)
Cross Gear & Machine Co., 3250 Bellevue Ave., Detroit, Mich.
Fitchburg Grinding Machine Corp., Fitchburg, Mass.

GRINDING—PRECISION (Contract)
Ace Mfg. Corp., 1201 East Erie St., Philadelphia, Pa.

GRINDING WHEELS
Abrasive Co., Tacony & Fraley Sts., Philadelphia, Pa.
Atkins, E. C., & Co., 427 S. Illinois St., Indianapolis, Ind.
Bay State Abrasive Products Co., Westboro, Mass.
Blanchard Machine, Co., The, 64 State St., Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Chicago Wheel and Mfg. Co., Dept. ST-7, 1101 W. Monroe St., Chicago, Ill.
DeSanno, A. P., & Son Inc., 436 Wheatland St., Phoenixville, Pa.
Macklin Co., Dept. M, Jackson, Mich.
Norton Co., Worcester, Mass.
Sterling Grinding Wheel Div., Cleveland Quarries Co., Tiffin, O.
United States Rubber Co., Mechanical Goods Div., 1230 Sixth Ave., New York City.

GRINDING WHEELS (Mounted)
Abrasive Co., Tacony & Fraley Sts., Philadelphia, Pa.
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Chicago Wheel & Manufacturing Co., Dept. ST-7, 1101 W. Monroe St., Chicago, Ill.
DeSanno, A. P., & Son, Inc., 436 Wheatland St., Phoenixville, Pa.
Macklin Co., Dept. M, Jackson, Mich.
Norton Co., Worcester, Mass.

GRINDING WHEELS (Segmental)
Abrasive Co., Tacony & Fraley Sts., Philadelphia, Pa.
Bay State Abrasive Products Co., Westboro, Mass.
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Macklin Co., Dept. M, Jackson, Mich.
Norton Co., Worcester, Mass.
Sterling Grinding Wheel Div., Cleveland Quarries Co., Tiffin, O.

GUIDE SHOES
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

GUIDES (Mill)
Ampco Metal, Inc., Dept. S-7, 3830 W. Burnham St., Milwaukee, Wis.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

GUNS (Blast Furnace Mud)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

GUNS (Steam, Hydraulic, Electric)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

HAMMER BOARDS
Irwin, H. G., Lumber Co., Garland, Pa.

HAMMERS (Drop)
Alliance Machine Co., The, Alliance, O.
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.

HAMMERS (Pneumatic)
Cleveland Pneumatic Tool Co., 3781 E. 77th St., Cleveland, O.

HAMMERS (Power)
Yoder Co., The, 55 Walworth Ave., Cleveland, O.

HAMMERS (Steam)
Alliance Machine Co., The, Alliance, O.
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.

HANGERS
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
Bantam Bearings Div., The Torrington Co., South Bend, Ind.
Crane Co., 836 S. Michigan, Ave., Chicago, Ill.
Fafnir Bearing Co., New Britain, Conn.
Grinnell Co., Inc., Providence, R. I.
Hyatt Bearings Division, General Motors Corp., Harrison, N. J.
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.
New Departure Div., General Motors Corp., Bristol, Conn.
Power Piping Div. of Blaw-Knox Co., Beaver & Western Ave., Pittsburgh, Pa.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

HEADING MACHINERY
Hydraulic Press Mfg. Co., Mt. Gilead, O.
National Machinery Co., Tiffin, O.

HEAT EXCHANGERS
Ross Heater & Mfg. Co., 1407 West Ave., Buffalo, N. Y.
Standard Tube Co., The, 14600 Woodward Ave., Detroit, Mich.
Struthers Wells Corp., Titusville, Pa.

HEAT TREATING
Commercial Metals Treating, Inc., 177 S. St. Clair St., Toledo, O.
Kaydon Engineering Co., The, Muskegon, Mich.
Lakeside Steel Improvement Co., The, 5418 Lakeside Ave., Cleveland, O.
Oliver Iron & Steel Corp., S. 10th & Muriel Sts., Pittsburgh, Pa.

HEAT TREATING MATERIALS
Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia, Pa.
Park Chemical Co., 8078 Military Ave., Detroit, Mich.

HEATERS (Air)
Despatch Oven Co., 722 Central Ave., Minneapolis, Minn.
Mahon, The R. C., Co., 8650 Mt. Elliott Ave., Detroit, Mich.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Standard Tube Co., The, 14600 Woodward Ave., Detroit, Mich.

HEATERS (Electric Roll)
Freyn Engineering Co., 310 S. Michigan Ave., Chicago, Ill.

HEATERS (Instantaneous)
Ross Heater & Mfg. Co., 1407 West Ave., Buffalo, N. Y.

HEATERS (Unit)
American Foundry Equipment Co., The, 509 S. Byrkit St., Mishawaka, Ind.
Buffalo Forge Co., 158 Mortimer St., Buffalo, N. Y.
Cutler-Hammer Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Dravo Corp., (Machinery Div.) 300 Penn Ave., Pittsburgh, Pa.
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.
Graybar Electric Co., 420 Lexington Ave., New York City.
Grinnell Co., Inc., Providence, R. I.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Sturtevant, B. F. Co., Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co., Mansfield, O.

HELMETS (Blast Cleaning)
American Foundry Equipment Co., The, 509 S. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.

HINGES AND BUTTS
Veeder-Root, Inc., Hartford, Conn.

HITCHINGS (Mine Car)
American Chain & Cable Co., Inc., Bridgeport, Conn.

HOB CHECKING MACHINES
Detroit Tap & Tool Co., 8432 Butler St., Detroit, Mich.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

HOBS
Brown & Sharpe Mfg. Co., Providence, R. I.
Genesee Tool Co., Fenton, Mich.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

HOISTS (Chain)
American MonoRail Co., The 13102 Athens Ave., Cleveland, O.
Chicago Tramrail Co., 2910 W. Carroll Ave., Chicago, Ill.
Cleveland Tramrail Div., of The Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Ford Chain Block Div., American Chain & Cable Co., Inc., 2nd & Diamond Sts., Philadelphia, Pa.
Reading Chain & Block Corp., 2102 Adams St., Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.

HOISTS (Electric)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Chicago Tramrail Co., 2910 W. Carroll Ave., Chicago, Ill.
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Euclid Crane & Hoist Co., The, 1365 Chardon Rd., Euclid, O.
Graybar Electric Co., 420 Lexington Ave., New York City
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Reading Chain & Block Corp., 2102 Adams St., Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.
Wright Mfg. Div. of American Chain & Cable Co. Inc., York, Pa.

HOISTS (Monorail)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Chicago Tramrail Co., 2910 W. Carroll Ave., Chicago, Ill.
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Euclid Crane & Hoist Co., The, 1365 Chardon Rd., Euclid, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Reading Chain & Block Corp., 2102 Adams St., Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

HOISTS (Pneumatic)
Curtis Pneumatic Machinery Div. of Curtis Mfg. Co., 1996 Kienlen Ave., St. Louis, Mo.
Galland-Henning Mfg. Co., 2747 South 31st St., Milwaukee, Wis.

HONING MACHINES
Barnes, W. F. and John, Co., Rockford, Ill.
Micromatic Hone Corp., 8100 Schoolcraft Ave., Detroit, Mich.

HOOKS (Chain)
American Chain Div. American Chain & Cable Co., Inc., York, Pa.

HOOPS (Welded Wire)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Keystone Steel & Wire Co., Dept. AC, Peoria, Ill.

HOOPS—See BANDS AND HOOPS (Iron and Steel)

HOSE (Flexible Metal)
American Metal Hose Branch of The American Brass Co., Waterbury, Conn.
Chicago Metal Hose Corp., 1315 S. Third St., Maywood, Ill.
Pennsylvania Flexible Metallic Tubing Co., 7219 Powers Lane, Philadelphia, Pa.

HOSE (Flexible Nonmetallic)
Weatherhead Co., The, 300 E. 131st St., Cleveland, O.

HOSE (Rubber)
Cleveland Pneumatic Tool Co., 3781 E. 77th St., Cleveland, O.
United States Rubber Co., Mechanical Goods Div., 1230 Sixth Ave., New York City.
Welding Engineering Co., 264 E. Ogden Ave., Milwaukee, Wis.

HOSE REINFORCEMENT MACHINES
Fidelity Machine Co., 3908-18 Frankford Ave., Philadelphia, Pa.

HUMIDIFIERS (Industrial)
Grinnell Co., Inc., Providence, R. I.

HYDRAULIC MACHINERY
Alliance Machine Co., The, Alliance, O.
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Beatty Machine & Mfg. Co., Hammond, Ind.
Bethlehem Steel Co., Bethlehem, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Cross Gear & Machine Co., 3250 Bellevue Ave., Detroit, Mich.
Denison Engineering Co., The, 1163 Dublin Rd., Columbus, O.
Chicago, Ill.
Farquhar, A. B., Co., Ltd., 195 Duke St., York, Pa.
Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago, Ill.
Hydraulic Machinery Inc., The, 12825 Ford Rd., Dearborn, Mich.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Hydropress, Inc., 570 Lexington Ave., New York City.
Morgan Engineering Co., The, Alliance, O.
Racine Tool & Machine Co., Racine, Wis.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Watson-Stillman Co., Roselle, N. J.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

HYDRAULIC PRESSES—See PRESSES (Hydraulic)

HYDRAULIC UNITS
Cross Gear & Machine Co., 3250 Bellevue Ave., Detroit, Mich.
Denison Engineering Co., The, 1163 Dublin Rd., Columbus, O.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Hydraulic Machine Co., The, 12825 Ford Rd., Dearborn, Mich.
Racine Tool & Machine Co., Racine, Wis.
Weinman Pump & Supply Co., The, 207-209 Boulevard of the Allies, Pittsburgh, Pa.

INDICATORS (Blast Furnace Stock Line)
Brostus, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.

INDICATORS (Temperature)
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
Westinghouse Electric & Mfg. Co., Orange Ave., Newark, N. J.

INDUCTION BRAZING and SOLDERING EQUIPMENT
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Induction Heating Corp., 389 Lafayette St., New York City.
Johnson Gas Appliance Co., 591 "E" Ave., N.W., Cedar Rapids, Iowa
Lepel High Frequency Laboratories, Inc., 39 W. 60 St., New York City.
Ohio Crankshaft Co., The, 6600 Clement Ave., Cleveland, O.

INDUCTION HEATING and HARDENING EQUIPMENT
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Induction Heating Corp., 389 Lafayette St., New York City.
Lepel High Frequency Laboratories, Inc., 39 W. 60 St., New York City.
Ohio Crankshaft Co., The, 6600 Clement Ave., Cleveland, O.
Westinghouse Electric & Mfg. Co., Baltimore, Md.

INGOT MOLD WASH (Graphite)
National Carbon Co., W. 117th St. & Madison Ave., Cleveland, O.
United States Graphite Co., The, Saginaw, Mich.

INGOT MOLDS
Bethlehem Steel Co., Bethlehem, Pa.
National Carbon Co., W. 117th St. & Madison Ave., Cleveland, O.
Shenango-Penn Mold Co., Oliver Bldg., Pittsburgh, Pa.
Valley Mould & Iron Corp., Hubbard, O.

INHIBITORS
American Chemical Paint Co., Ambler, Pa.

INSPECTION EQUIPMENT
Magnaflux Corp., 5912 Northwest Highway, Chicago, Ill.
Sheffield Corp., The, 721 Springfield St., Dayton, O.

INSPECTING TOOLS
Matthews, Jas. H., & Co., 3978 Forbes St., Pittsburgh, Pa.
Scherr, George, Co., 128 Lafayette St., New York City.
Sheffield Corp., The, 721 Springfield St., Dayton, O.

INSTRUMENTS (Counting)
Veeder-Root, Inc., Hartford, Conn.

INSTRUMENTS (Electric-Indicating and Recording)
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
Westinghouse Electric & Mfg. Co., Dept. 7N, East Pittsburgh, Pa.

INSULATING BLOCK OR BRICK
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Carborundum Co., The, Niagara Falls, N. Y.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.
Laclede-Christy Clay Products Co., Ambassador Bldg., St. Louis, Mo.
National Fireproofing Corp., 202 E. Ohio St., Pittsburgh, Pa.
Quigley Company, Inc., 56 W. 45th St., New York City.

INSULATING CONCRETE
Atlas Lumnite Cement Co., Dept. S, Chrysler Bldg., New York City.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.
Laclede-Christy Clay Products Co., Ambassador Bldg., St. Louis, Mo.
Quigley Co., Inc. 56 W. 45th St., New York City.

INSULATING POWDER AND CEMENT
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.
Laclede-Christy Clay Products Co., Ambassador Bldg., St. Louis, Mo.

INSULATION (Building)
Johns-Manville Corp., 22 E. 40th St., New York City.

INSULATION (Furnace, Boiler Settings, Ovens, Steam Pipe, Etc.)
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.
Laclede-Christy Clay Products Co., Ambassador Bldg., St. Louis, Mo.

IRON ORE
Alan Wood Steel Co., Conshohocken, Pa.
Cleveland-Cliffs Iron Co., The, Union Commerce Bldg., Cleveland, O.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.

JACKS (Mechanical, Hydraulic, Screw)
Buda Co., The, Harvey, Ill.

JETS (Steam)
Heil Engineering Co., 12903 Elmwood Ave., Cleveland, O.

JIG BORERS
Bryant Machinery & Engineering Co., 400 W. Madison St., Chicago, Ill.
Cleereman Machine Tool Co., Green Bay, Wis.
Fosdick Machine Tool Co., The, 1638 Blue Rock St., Cincinnati, O.

JIGS AND FIXTURES
Ace Mfg. Corp., 1201 East Erie St., Philadelphia, Pa.
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Matthews, Jas. H., & Co., 3978 Forbes St., Pittsburgh, Pa.
Sheffield Corp., The, 721 Springfield St., Dayton, O.

KEYS (Machine or Woodruff)
Moltrup Steel Products Co., Beaver Falls, Pa.

KNIVES
American Shear Knife Co., P. O. Box 355, Homestead, Pa.
Atkins, E. C., & Co., 427 S. Illinois St., Indianapolis, Ind.
Cowles Tool Co., 2086 W. 110th St., Cleveland, O.
Disston, Henry, & Sons, Inc., 726 Tacony, Philadelphia, Pa.
Ohio Knife Co., B. & O. R.R. & Dreman Ave., Cincinnati, O.

LABORATORY EQUIPMENT
Dietert, Harry W., Co., 9330J Roselawn Ave., Detroit, Mich.

LABORATORY WARE
Bay State Abrasive Products Co., Westboro, Mass.
Norton Company, Worcester, Mass.

LACQUERS (Metal)
Egyptian Lacquer Mfg. Co., The, 1270 Sixth Ave., New York City.

LADLES
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.

LADLES (Stainless Steel for Die Casters)
Milwaukee Metal Spinning Co., 3502 W. Pierce St., Milwaukee, Wis.

LAPPING MACHINES
Cincinnati Grinders, Incorporated, Cincinnati, O.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.
Norton Company, Worcester, Mass.

LARRIES (Coal)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co., Findlay, O.

LATHE CENTERS
Carboloy Co., Inc., 11141 E. 8 Mile Rd., Detroit, Mich.
Chicago Mfg. & Distr. Co., 1928 W. 46th St., Chicago, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Genesee Tool Co., Fenton, Mich.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.
South Bend Lathe Works, South Bend, Ind.

LATHE DOGS (Drop Forged)
South Bend Lathe Works, South Bend, Ind.
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

LATHE TOOLS (Carbide Tipped)
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

LATHES (Automatic)
Brown & Sharpe Mfg. Co., Providence, R. I.
Bullard Co., The, Bridgeport, Conn.
Cross Gear & Machine Co., 3250 Bellevue Ave., Detroit, Mich.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vt.
LeBlond, R. K. Machine Tool Co., The, Dept. J-2, Cincinnati, O.
Monarch Machine Tool Co., Sidney, O.
Sheffield Corp., The, 721 Springfield St., Dayton, O.
Wickes Brothers, Saginaw, Mich.

LATHES (Buffing & Polishing)
Chicago Wheel & Mfg. Co., Dept. ST-7, 1101 W. Monroe St., Chicago, Ill.
Delta Mfg. Co., The, 620 E. Vienna Ave., Milwaukee, Wis.
Walker-Turner Co., Inc., 5013 Berckman St., Plainfield, N. J.

LATHES (Chucking)

Bullard Co., The, Bridgeport, Conn.
Cross Gear & Machine Co., 3250 Bellevue Ave., Detroit, Mich.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

LATHES (Crankshaft)

LeBlond, R. K. Machine Tool Co., The, Dept. J-2, Cincinnati, O.
Wickes Brothers, Saginaw, Mich.

LATHES (Double End)

Consolidated Machine Tool Corp., Winton & Blossom Rds., Rochester, N. Y.
Wickes Brothers, Saginaw, Mich.

LATHES (Engine)

Consolidated Machine Tool Corp., Winton & Blossom Rds., Rochester, N. Y.
LeBlond, R. K. Machine Tool Co., The, Dept. J-2, Cincinnati, O.
Monarch Machine Tool Co., Sidney, O.
South Bend Lathe Works, South Bend, Ind.
Wickes Brothers, Saginaw, Mich.

LATHES (Gun)

Consolidated Machine Tool Corp., Winton & Blossom Rds., Rochester, N. Y.
LeBlond, R. K. Machine Tool Co., The, Dept. J-2, Cincinnati, O.
Wickes Brothers, Saginaw, Mich.

LATHES (Railroad Car & Driving Wheel)

Consolidated Machine Tool Corp., Winton & Blossom Rds., Rochester, N. Y.
Sellers, William, & Co., Inc., 16th & Callowhill Sts., Philadelphia, Pa.

LATHES (Roll Turning)

Aetna-Standard Engineering Co., The Home Savings Bank Bldg., Youngstown, Ohio
Consolidated Machine Tool Corp., Winton & Blossom Rds., Rochester, N. Y.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LATHES (Turret)

Brown & Sharpe Mfg. Co., Providence, R. I.
Bullard Company, The, Bridgeport, Conn.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vt.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.
South Bend Lathe Works, South Bend, Ind.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LATHES (Turret, Vertical)

Bullard Co., The, Bridgeport, Conn.

LEAD (Pigs)

Anaconda Sales Co., 25 Broadway, New York City.
St. Joseph Lead Co., 250 Park Ave., New York City.

LEAD (Red or White)

National Lead Co., 111 Broadway, New York City

LEAD (Sheets, Pipe, etc.)

National Lead Co., 111 Broadway, New York City

LEAD (Tellurium)

National Lead Co., 111 Broadway, New York City.

LEVELING MACHINES

Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown, O.
Erie Foundry Co., Erie, Pa.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Hydropress, Inc., 570 Lexington Ave., New York City.
Lewis Fdry. & Mach. Div. of Blaw-Knox Co., Pittsburgh, Pa.
McKay Machine Co., Youngstown, O.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Wean Engineering Co., Inc., The, Warren, O.
Yoder Co., The, 55 Walworth Ave., Cleveland, O.

LIFT TRUCKS—See TRUCKS (Lift)

LIFTING MAGNETS—See MAGNETS (Lifting)

LIFTS (Monorail)

American MonoRail Co., The 13102 Athens Ave., Cleveland, O.
Cleveland Crane & Engineering Co., The, 1125 E. 283rd St., Wickliffe, O.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

LIGHTING (Fluorescent Equipment)

General Electric Co., Sec. A 333-90, Appliance & Merchandising Dept., Bridgeport, Conn.
Graybar Electric Co., 420 Lexington Ave., New York City
Ward Leonard Electric Co., 65 South St., Mt. Vernon, N. Y.
Westinghouse Electric & Mfg. Co., 1216 W. 58th St., Cleveland, O.

LIGHTING (Industrial)

Graybar Electric Co., 420 Lexington Ave., New York City.
Westinghouse Electric & Mfg. Co., 1216 W. 58th St., Cleveland, O.

LIME (Chemical and Fluxing)

Baker, The J. E. Co., 114 N. George St., York, Pa.

LIMESTONE (Open Hearth & Blast Furnace)

Baker, The J. E. Co., 114 N. George St., York, Pa.
Basic Refractories, Inc., Hanna Bldg., Cleveland, O.

LINERS (Mill)

Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.

LINERS (Pump and Cylinder)

Shenango-Penn Mold Co., 411 W. Third St., Dover, O.

LOCOMOTIVE CRANES—See CRANES (Locomotive)

LOCOMOTIVES (Diesel-Electric)

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Davenport-Besler Corp., Davenport, Iowa.
Differential Steel Car Co., Findlay, O.
Plymouth Locomotive Works, Div., Fate-Root-Heath Co., Plymouth, O.
Porter, H. K., Co., Inc., 49th & Harrison Sts., Pittsburgh, Pa.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Diesel-Mechanical)

Davenport-Besler Corp., Davenport, Iowa.
Plymouth Locomotive Works, Div., Fate-Root-Heath Co., Plymouth, O.
Porter, H. K., Co., Inc., 49th & Harrison Sts., Pittsburgh, Pa.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Electric)

Davenport-Besler Corp., Davenport, Iowa.
Porter, H. K., Co., Inc., 49th & Harrison Sts., Pittsburgh, Pa.

LOCOMOTIVES (Electric Trolley)

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co., Findlay, O.
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Fireless)

Porter, H. K., Co. Inc., 49th & Harrison Sts., Pittsburgh, Pa.

LOCOMOTIVES (Gasoline-Electric)

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Davenport-Besler Corp., Davenport, Iowa.
Differential Steel Car Co., Findlay, O.
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
Plymouth Locomotive Works, Div., Fate-Root-Heath Co., Plymouth, O.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Gasoline Mechanical)

Davenport-Besler Corp., Davenport, Iowa.
Differential Steel Car Co., Findlay, O.
Plymouth Locomotive Works, Div., Fate-Root-Heath Co., Plymouth, O.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Oil-Electric)

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co., Findlay, O.

LOCOMOTIVES (Steam)

Davenport-Besler Corp., Davenport, Iowa.
Porter, H. K., Co. Inc., 49th & Harrison Sts., Pittsburgh, Pa.

LOCOMOTIVES (Storage Battery)

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.
Whitcomb Locomotive Co., Rochelle, Ill.

LOW TEMPERATURE STORAGE EQUIPMENT

Motor Products Corp., Deep Freeze Div., 2309 Davis St., N. Chicago, Ill.

LUBRICANTS (Graphite)

Acheson Colloids Corp., Port Huron, Mich.
United States Graphite Co., The, Saginaw, Mich.

LUBRICANTS (Industrial)

Acheson Colloids Corp., Port Huron, Mich.
Chicago Mfg. & Distr. Co., 1928 W. 46th St., Chicago, Ill.
Cities Service Companies, Room 1398, Sixty Wall Tower, New York City.
Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia, Pa.
New York & New Jersey Lubricant Co., 292 Madison Ave., New York City.
Penola, Incorporated, 34th & Smallman Sts., Pittsburgh, Pa.
Shell Oil Co., Inc., 50 W. 50th St., New York City.
Sinclair Refining Co., 630 Fifth Ave., New York City.
Socony-Vacuum Oil Co., Inc., 26 Broadway, New York City.
Sun Oil Co., Dept. 1, 1608 Walnut St., Philadelphia, Pa.
Texas Co., The, 135 East 42nd St., New York, N. Y.
Tide Water Associated Oil Co., 17 Battery Place, New York City.

LUBRICATING SYSTEMS

Blaw-Knox Co., Blawnox, Pa.
Farval Corp., The, 3270 E. 80th St., Cleveland, O.
Hills-McCanna Co., 2434 Nelson St., Chicago, Ill.
Trabon Engineering Corp., 1818 East 40th St., Cleveland, O.

LUGS (Terminal)

Calumet and Hecla Consolidated Copper Co., Wolverine Tube Div., 1435 Central Ave., Detroit, Mich.

MACHINE WORK

Ace Mfg. Corp., 1201 East Erie St., Philadelphia, Pa.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Brake Shoe Co., Kellogg Div., 97 Humboldt St., Rochester, N. Y.
American Metal Products Co., 5959 Linsdale Ave., Detroit, Mich.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Federal Shipbuilding & Dry Dock Co., Kearny, N. J.
Fidelity Machine Co., 3908-18 Frankford Ave., Philadelphia, Pa.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Kaydon Engineering Co., The, Muskegon, Mich.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.
Scaife Co., Ann St., Oakmont, Pa.

MACHINERY (Bag Closing)

Acme Steel Co., 2826 Archer Ave., Chicago, Ill.
Fidelity Machine Co., 3908-18 Frankford Ave., Philadelphia, Pa.

MACHINERY (Flexible Shaft)

Walker-Turner Co., Inc., 5013 Berckman St., Plainfield, N. J.

MACHINERY (Special)

Aetna-Standard Engineering Co., The Home Savings Bank Bldg., Youngstown, O.
Alliance Machine Co., The, Alliance, O.
American Foundry Equipment Co., The, 509 S. Byrkit St., Mishawaka, Ind.
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Barnes, W. F. and John, Co., Rockford, Ill.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bayard, M. L., & Co., 20th & Indiana Ave., Philadelphia, Pa.
Beatty Machine & Mfg. Co., Hammond, Ind.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.
Cleveland Automatic Machine Co., 2269 Ashland Ave., Cleveland, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O.
Continental Machines, Inc., 1324 Washington Ave., Minneapolis, Minn.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Cross Gear & Machine Co., 3250 Bellevue Ave., Detroit, Mich.
Denison Engineering Co., The, 1163 Dublin Rd., Columbus, O.
Etna Machine Co., The, 3400 Maplewood Ave., Toledo, O.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Farquhar, A. B., Co., Ltd., 195 Duke St., York, Pa.
Ferracute Machine Co., Bridgeton, N. J.
Fidelity Machine Co., 3908-18 Frankford Ave., Philadelphia, Pa.
Foote Bros. Gear & Machine Co., 5301 S. Western Blvd., Chicago, Ill.
Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago, Ill.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Lapointe Machine Tool Co., The, 34 Tower St., Hudson, Mass.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Medart Co., The, 3520 DeKalb St., St. Louis, Mo.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa
Morgan Engineering Co., The, Alliance, O.

MACHINERY (Special)—Con.

National Broach & Machine Co., 5600 St., Jean, Detroit, Mich.
National Roll & Fdry. Co., The, Avonmore, Pa.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Oil Well Supply Co., Dallas, Texas.
Sellers, William, & Co., Inc., 16th & Callowhill Sts., Philadelphia, Pa.
Sheffield Corp., The, 721 Springfield St., Dayton, O.
Shuster, F. B., Co., The, New Haven, Conn.
Struthers Wells Corp., Titusville, Pa.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Wean Engineering Co., Inc., The, Warren, O.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.
Yoder Co., The, 55 Walworth Ave., Cleveland, O.

MACHINERY (Used & Rebuilt)

Albert, L., & Son, Whitehead Rd., Trenton, N. J.
Dulien Steel Products, Inc., 414 First Ave., So., Seattle, Wash.
General Blower Co., 404 N. Peoria St., Chicago, Ill.
Iron & Steel Products, Inc., Hegewisch Sta., Chicago, Ill.
Lang Machinery Co., 28th & A.V.R.R., Pittsburgh, Pa.
Mississippi Valley Equipment Co., 511 Locust St., St. Louis, Mo.
West Penn Machinery Co., 1208 House Bldg., Pittsburgh, Pa.

MACHINES (Marking)

Matthews, Jas. H., & Co., 3978 Forbes St., Pittsburgh, Pa.

MACHINES (Stapling & Stitching)

Acme Steel Co., 2826 Archer Ave., Chicago, Ill.

MAGNESIA (Electrically Fused)

Norton Co., Worcester, Mass.

MAGNESIA-REFRACTORIES—See REFRACTORIES (Magnesia)

MAGNESIUM

Dow Chemical Co., The, Midland, Mich.

MAGNETIC INSPECTION EQUIPMENT

Magnaflux Corp., 5912 Northwest Highway, Chicago, Ill.

MAGNETIC SEPARATORS—See SEPARATORS (Magnetic)

MAGNETS (Lifting)

Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland, O.
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.

MAGNETS (Separating)

Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The 2700 E. 79th St., Cleveland, O.
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.

MANGANESE METAL AND ALLOYS

American Brake Shoe Co., American Manganese Steel Div., 389 E. 14th St., Chicago, Ill.
Electro Metallurgical Co., 30 E. 42nd St., New York City.

MANGANESE ORE

Cuban-American Manganese Corp., 122 E. 42nd St., New York City.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

MANIPULATORS

Alliance Machine Co., The, Alliance, O.
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.

MARKING DEVICES

Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.
Helmer-Staley, Inc., 327 W. Huron St., Chicago, Ill.
Matthews, Jas. H., & Co., 3978 Forbes St., Pittsburgh, Pa.

METAL (Perforated)—See PERFORATED METAL

METAL CLEANERS

American Chemical Paint Co., Ambler, Pa.
Detroit Rex Products Co., 13029 Hillview Ave., Detroit, Mich.
Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia, Pa.
MacDermid, Inc., Waterbury, Conn.
Magnus Chemical Co., Inc., 206 South Ave., Garwood, N. J.
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.
Turco Products, Inc., 6135 S. Central Ave., Los Angeles, Calif.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

METAL CLEANING MACHINES

American Foundry Equipment Co., The, 509 S. Byrkit St., Mishawaka, Ind.
Bullard Co., The, Bridgeport, Conn.
Detroit Rex Products Co., 13029 Hillview Ave., Detroit, Mich.
Howard Eng. & Mfg. Co., The, 1052 Hulbert Ave., Cincinnati, 14, O.
Magnus Chemical Co., Inc., 206 South Ave., Garwood, N. J.
Mahon, The R. C., Co., 8650 Mt. Elliott Ave., Detroit, Mich.
Pangborn Corporation, Hagerstown, Md.
Ransohoff, N., Inc., 1317 Township Ave., Cincinnati, O.
Salem Engineering Co., 714 S. Broadway, Salem, O.

METAL DUPLICATION (Without Dies)

O'Neil-Irwin Mfg. Co., 304 8th Ave., So., Minneapolis, Minn.

METAL FINISHES

Alrose Chemical Co., 180 Mill St., Providence, R. I.
Chicago Vitreous Enamel Product Co., 1425 S. 55th Court, Cicero, Ill.
Egyptian Lacquer Mfg. Co., The, 1270 Sixth Ave., New York City.

METAL FORMING MACHINERY

Yoder Co., The, 55 Walworth Ave., Cleveland, O.

METALS (Nonferrous)

Ajax Metal Co., Philadelphia, Pa.
Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
American Brass Co., The, 25 Broadway, New York City.
Ampco Metal, Inc., Dept. S-7, 3830 W. Burnham St., Milwaukee, Wis.
Bohn Aluminum & Brass Corp., Lafayette Bldg., Detroit, Mich.
Bridgeport Brass Co., Bridgeport, Conn.
Bristol Brass Corp., The, Bristol, Conn.
Cadman, A. W. Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Copperweld Steel Co., Glassport, Pa.
Dow Chemical Co., The, Midland, Mich.
Hammond Brass Works, 1844 Summer St., Hammond, Ind.
Harper, The H. M. Co., 2646 Fletcher St., Chicago, Ill.
International Nickel Co., Inc., The, 67 Wall St., New York City.
National Bearing Metals Corp., 4930 Manchester Ave., St. Louis, Mo.
Revere Copper & Brass Co., Inc., 230 Park Ave., New York City
Shenango-Penn Mold Co., 411 W. Third St., Dover, O.
Western Cartridge Co., Brass Mill Div., East Alton, Ill.

METALS (Nonferrous—Corrosion & Abrasive Resistant)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
American Brake Shoe Co., Brakeshoe & Castings Div., 230 Park Ave., New York City.
Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.

METERS (Air & Hydraulic)

Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Worthington Pump & Machinery Corp., Harrison, N. J.

MICROMETERS

Brown & Sharpe Mfg. Co., Providence, R. I.
Scherr, George, Co., 128 Lafayette St., New York City.

MILLING CUTTERS

Atkins, E. C., & Co., 427 S. Illinois St., Indianapolis, Ind.
Brown & Sharpe Mfg. Co., Providence, R. I.
Carboloy Co., Inc., 11141 E. 8 Mile Rd., Detroit, Mich.
Detroit Tap & Tool Co., 8432 Butler St., Detroit, Mich.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Genesee Tool Co., Fenton, Mich.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

MILLING MACHINE ATTACHMENTS

Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine Co., Cincinnati, Ohio
Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee, Wis.
Kempsmith Machine Co., 1819 S. 71st St., Milwaukee, Wis.

MILLING MACHINES

Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine Co., Cincinnati, O.
Consolidated Machine Tool Corp., Winton & Blossom Rds., Rochester, N. Y.
Cross Gear & Machine Co., 3250 Bellevue Ave., Detroit, Mich.
Davis & Thompson Co., 6619 W. Mitchell St., Milwaukee, Wis.
Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee, Wis.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.
Ohio Machine Tool Co., The, Kenton, O.
Sellers, William, & Co., Inc., 16th & Callowhill Sts., Philadelphia, Pa.

MILLING MACHINES (Milling and Centering Combined)

Cross Gear & Machine Co., 3250 Bellevue Ave., Detroit, Mich.
Jones & Lamson Machine Co., Springfield, Vt.

MILLS (Blooming, Universal, Plate, Sheet, Tin, Bar, Strip, Etc.)—See ROLLING MILL EQUIPMENT

MIXERS (Hot Metal)

Bartlett-Hayward Div., Koppers Co., Baltimore, Md.

MIXING EQUIPMENT

Porter, H. K., Co., Inc., 49th & Harrison Sts., Pittsburgh, Pa.

MOLD PLUGS

National Carbon Co., W. 117th St. & Madison Ave., Cleveland, O.

MOLDS (Ingot)—See INGOT MOLDS

MOLYBDENUM

Climax Molybdenum Co., 500 Fifth Ave., New York City.
Molybdenum Corp. of America, Grant Bldg., Pittsburgh, Pa.

MONEL METAL (All Commercial Forms)

International Nickel Co., Inc., The, 67 Wall St., New York City.

MONORAIL SYSTEMS

American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Reading Chain & Block Corp., 2102 Adams St., Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

MOTOR-ROLLERS

Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.

MOTOR CONTROLS

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
Graybar Electric Co., 420 Lexington Ave., New York City.
Ward Leonard Electric Co., 65 South St., Mt. Vernon, N. Y.
Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.

MOTORS (Electric)

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Century Electric Co., 1806 Pine St., St. Louis, Mo.
Delta Mfg. Co., The, 620 E. Vienna Ave., Milwaukee, Wis.
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O.
Master Electric Co., The, 100 Davis Ave., Dayton, O.
Reliance Electric & Eng. Co., 1088 Ivanhoe Rd., Cleveland, O.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Walker-Turner Co., Inc., 5013 Berckman St., Plainfield, N. J.
Ward Leonard Electric Co., 65 South St., Mt. Vernon, N. Y.
Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.

MUCK BAR

Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

MUFFLERS (Spark Arresting)

Donaldson Co., 666 Pelham St., St. Paul, Minn.

NAILS (*Also Stainless)

Alan Wood Steel Co., Conshohocken, Pa.
Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
American Steel and Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
*Hassall, John, Inc., 402 Oakland St., Brooklyn, N. Y.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Keystone Steel & Wire Co., Dept. AC, Peoria, Ill.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

NAILS (Coated & Galvanized)

Alan Wood Steel Co., Conshohocken, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.

NAILS (Coated & Galvanized)—Cont.

Keystone Steel & Wire Co., Dept. A. C., Peoria, Ill.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

NAME PLATES

Matthews, Jas. H., & Co., 3978 Forbes St., Pittsburgh, Pa.

NIBBLING MACHINES

Andrew C. Campbell Div., American Chain & Cable Co., Inc., Bridgeport, Conn.

NICKEL (All Commercial Forms)

International Nickel Co., Inc., The, 67 Wall St., New York City.

NITRIDING

Nitralloy Corp., The, 230 Park Ave., New York City.

NOZZLES

Aldrich Pump Co., 2 Gordon St., Allentown, Pa.
American Foundry Equipment Co., The, 509 S. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.

NUTS (*Also Stainless)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2917 E. 79th St., Cleveland, O.
*Elastic Stop Nut Corp., 2340A Vauxhall Rd., Union, N. J.
Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa.
*Harper, H. M. Co., The, 2646 Fletcher St., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
*Oliver Iron & Steel Corp., S. 10th & Muriel Sts., Pittsburgh, Pa.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Tinnerman Products, Inc., 2039 Fulton Rd., Cleveland, O.
Triplex Screw Co., 5341 Grant Ave. Cleveland, O.

NUTS (Castellated)

Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2917 E. 79th St., Cleveland, O.
Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Acme Co., The, 170 E. 131 St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS (Machine Screw)

Elastic Stop Nut Corp., 2340A Vauxhall Rd., Union, N. J.
Central Screw Company, 3517 Shields Ave., Chicago, Ill.

NUTS (Nonferrous)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
Elastic Stop Nut Corp., 2340A Vauxhall Rd., Union, N. J.
Harper, H. M., Co., The, 2646 Fletcher St., Chicago, Ill.

NUTS (Self Locking)

Elastic Stop Nut Corp., 2340A Vauxhall Rd., Union, N. J.
Tinnerman Products, Inc., 2039 Fulton Rd., Cleveland, O.

NUTS (Semi-finished)

Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2917 E. 79th St., Cleveland, O.
Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Oliver Iron & Steel Corp., S. 10th & Muriel Sts., Pittsburgh, Pa.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS (Spring—Tension)

Tinnerman Products, Inc., 2039 Fulton Rd., Cleveland, O.

NUTS (Wing)

Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Parker-Kalon Corp., 194-200 Varick St., New York City.

OFFICE EQUIPMENT

Diebold Safe & Lock Co., 818 Mulberry Rd., Canton, O.

OIL SEALS

Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.
Syntron Co., Homer City, Pa.

OILS (Cutting)

Cities Service Companies, Room 1398, Sixty Wall Tower, New York City.
Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia, Pa.
Oakite Products, Inc., 22 Thames St., New York City.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.
Penola, Incorporated, 34th & Smallman Sts., Pittsburgh, Pa.
Shell Oil Co., Inc., 50 W. 50th St., New York City.
Sinclair Refining Co., 630 Fifth Ave., New York City.
Socony-Vacuum Oil Co., Inc., 26 Broadway, New York City.
Sun Oil Co., Dept. 1, 1608 Walnut St., Philadelphia, Pa.
Texas Co., The, 135 East 42nd St., New York, N. Y.
Tide Water Associated Oil Co., 17 Battery Place, New York City.

OILS (Lubricating)—See LUBRICANTS (Industrial)

OILS (Quenching)

Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia, Pa.
Park Chemical Co., 8076 Military Ave., Detroit, Mich.

OPEN-HEARTH FURNACES—See FURNACES (Open-Hearth)

OVENS (Annealing, Japanning, Tempering)

Blodgett, G. S., Co., Burlington, Vt.
Despatch Oven Co., 722 Central Ave., Minneapolis, Minn.
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Maehler, Paul, Co., The, 2208 W. Lake St., Chicago, Ill.
Mahon, The R. C., Co., 8650 Mt. Elliott Ave., Detroit, Mich.
Mahr Mfg. Co., 1702 N. Second St., Minneapolis, Minn.
Morrison Engineering Corp., 5005 Euclid Ave., Cleveland, O.
Salem Engineering Co., 714 S. Broadway, Salem, O.

OVENS (Baking & Drying)

Industrial Oven Engineering Co., The, 11621 Detroit Ave., Cleveland, O.

OVENS (Coke, By-Product)

Koppers Co., Engineering and Construction Div., 300 Koppers Bldg., Pittsburgh, Pa.

OVENS (Core and Mold)

Blodgett, G. S., Co., Burlington, Vt.
Despatch Oven Co., 722 Central Ave., Minneapolis, Minn.
Industrial Oven Engineering Co., The, 11621 Detroit Ave., Cleveland, O.
Maehler, Paul, Co., The, 2208 W. Lake St., Chicago, Ill.
Mahon, The R. C., Co., 8650 Mt. Elliott Ave., Detroit, Mich.
Mahr Mfg. Co., 1702 N. Second St., Minneapolis, Minn.
Morrison Engineering Corp., 5005 Euclid Ave., Cleveland, O.

OVENS (Gas or Oil Heat)

Industrial Oven Engineering Co., The, 11621 Detroit Ave., Cleveland, O.
Maehler, Paul, Co., The, 2208 W. Lake St., Chicago, Ill.
Mahr Mfg. Co., 1702 N. Second St., Minneapolis, Minn.
Morrison Engineering Corp., 5005 Euclid Ave., Cleveland, O.
Salem Engineering Co., 714 S. Broadway, Salem, O.

OXY-ACETYLENE WELDING AND CUTTING—See WELDING

OXYGEN GENERATORS

Independent Engineering Co., O'Fallon, Ill.

OXYGEN

Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.

PACKING (Asbestos or Rubber)

Johns-Manville Corp., 22 E. 40th St., New York City.
United States Rubber Co., Mechanical Goods Div., 1230 Sixth Ave., New York City.

PACKING (Carbon or Graphite)

National Carbon Co., W. 117th St. & Madison Ave., Cleveland, O.

PACKINGS (Mechanical Leather)

Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.
Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia, Pa.

PAINT (Alkali Resisting)

Pennsylvania Salt Mfg. Co., Widener Bldg., Philadelphia, Pa.

PAINT (Aluminum)

Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

PAINT (Heat Resisting, Rust Preventing, Priming)

American Chemical Paint Co., Ambler, Pa.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.
Laclede-Christy Clay Products Co., Ambassador Bldg., St. Louis, Mo.
Pennsylvania Salt Mfg. Co., Widener Bldg., Philadelphia, Pa.
Quigley Co., Inc., 56 W. 45th St., New York City

PAINT (Industrial)

National Lead Co., 111 Broadway, New York City

PAINT (Marking)

Helmer-Staley, Inc., 327 W. Huron St., Chicago, Ill.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.
Markal Co., 6 E. Lake St., Chicago, Ill.

PAINT (Stick Form)

Helmer-Staley, Inc., 327 W. Huron St., Chicago, Ill.

PAINTING

Hanlon-Gregory Galvanizing Co., 5515 Butler St., Pittsburgh, Pa.

PARTS (Precision)

Elastic Stop Nut Corp., 2340A Vauxhall Rd., Union, N. J.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Fidelity Machine Company, 3908-18 Frankford Ave., Philadelphia, Pa.
Kaydon Engineering Co., The, Muskegon, Mich.

PATTERNS (Wood or Metal)

Wellman Bronze & Aluminum Co., The, 2539 E. 93 St., Cleveland, O.

PERFORATED METAL

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Chicago Perforating Co., 2443 W. 24th Pl., Chicago, Ill.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.
Hendrick Mfg. Co., Carbondale, Pa.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

PHENOL RECOVERY PLANTS

Koppers Co., Engineering and Construction Div., 300 Koppers Bldg., Pittsburgh, Pa.

PHOSPHOR BRONZE—See BRASS, BRONZE, COPPER, PHOSPHOR BRONZE

PICKLING

Hanlon-Gregory Galvanizing Co., 5515 Butler St., Pittsburgh, Pa.

PICKLING COMPOUNDS

American Chemical Paint Co., Ambler, Pa.
American Zinc, Lead & Smelting Co., Paul Brown Bldg., St. Louis, Mo.
Cleveland Cliffs Iron Co., The, Union Commerce Bldg., Cleveland, O.
Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia, Pa.
New Jersey Zinc Co., 160 Front St., New York City.
Oakite Products, Inc., 22 Thames St., New York City.
Pennsylvania Salt Mfg. Co., Widener Bldg., Philadelphia, Pa.
Turco Products, Inc., 6135 S. Central Ave., Los Angeles, Cal.

PICKLING EQUIPMENT

Howard Eng. & Mfg. Co., The, 1052 Hulbert Ave., Cincinnati, 14, O.
International Nickel Co., Inc., The, 67 Wall St., New York City.
National Carbon Co., W. 117th St. & Madison Ave., Cleveland, O.
Ransohoff, N., Inc., 1317 Township Ave., Cincinnati, O.
Salem Engineering Co., 714 S. Broadway, Salem, O.

PICKLING MACHINERY

Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown, O.
Erie Foundry Co., Erie, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Wean Engineering Co., Inc., The, Warren, O.

PICKLING TANK LININGS

Ceilcote Co., 750 Rockefeller Bldg., Cleveland, O.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.
National Carbon Co., W. 117th St. & Madison Ave., Cleveland, O.
National Lead Co., 111 Broadway, New York City.
Pennsylvania Salt Mfg. Co., Widener Bldg., Philadelphia, Pa.
United States Rubber Co., Mechanical Goods Div., 1230 Sixth Ave., New York City.

PICKLING TANKS —See TANKS (Pickling)

PIERCER POINTS

Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

PIG IRON

Alan Wood Steel Co., Conshohocken, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Brooke, E. & G., Iron Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland-Cliffs Iron Co., The, Union Commerce Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Jackson Iron & Steel Co., Jackson, O.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.

PIG IRON—Cont.

Samuel, Frank & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

PILING (Iron and Steel)

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Mississippi Valley Equipment Co., 511 Locust St., St. Louis, Mo.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.

PILING (Pipe)

American Rolling Mill Co., The, 1411 Curtis St., Middletown, O.
Bethlehem Steel Co., Bethlehem, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

PILING (Pressure-Treated Wood)

Koppers Co., Wood Preserving Div., 300 Koppers Bldg., Pittsburgh, Pa.

PILLOW BLOCKS (Anti-Friction)

Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
Dodge Manufacturing Corp., Mishawaka, Ind.
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.
Medart Co., The, 3520 DeKalb St., St. Louis, Mo.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Philadelphia, Pa.

PILLOW BOXES

Norma-Hoffmann Bearings Corp., Stamford, Conn.

PINIONS (Mill)

Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
Lewis Fdry. & Mach. Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.
United Engineering & Foundry Co., First National Bank Bldg., Pittsburgh, Pa.

PINS (Case Hardened or Heat Treated)

Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa.

PINS (Taper)

Moltrup Steel Products Co., Beaver Falls, Pa.

PIPE (Aluminum or Magnesium)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
Dow Chemical Co., The, Midland, Mich.

PIPE (Brass, Bronze or Copper)

American Brass Co., The, 25 Broadway, New York City.
Bridgeport Brass Co., Bridgeport, Conn.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Lewin-Mathes Co., Chouteau Ave. at Twelfth St., St. Louis, Mo.
Mueller Brass Co., Port Huron, Mich.
Revere Copper & Brass Co., Inc., 230 Park Ave., New York City
Shenango-Penn Mold Co., 411 W. Third St., Dover, O.

PIPE (Cement Lined)

National Tube Co., Frick Bldg., Pittsburgh, Pa.

PIPE (Lead or Lead Lined)

National Lead Co., 111 Broadway, New York City

PIPE (Rubber Lined)

United States Rubber Co., Mechanical Goods Div., 1230 Sixth Ave., New York City.

PIPE (Square and Rectangular)

National Tube Co., Frick Bldg., Pittsburgh, Pa.
Tubular Service Corp., 32 Broadway, New York, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

PIPE (Steel)

Allegheny Ludlum Steel Corp., Dept. S-5, Brackenridge, Pa.
American Rolling Mill Co., The, 1411 Curtis St., Middletown, O.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Flori Pipe Co., The, Red Bud & Bulwer Aves., St. Louis, Mo.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tubular Service Corp., 32 Broadway, New York, N. Y.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

PIPE (Steel, Fabricated)

Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Flori Pipe Co., The, Red Bud & Bulwer Aves., St. Louis, Mo.

PIPE BALLS

Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

PIPE BENDING

Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Flori Pipe Co., The, Red Bud & Bulwer Aves., St. Louis, Mo.
Grinnell Co., Inc., Providence, R. I.
Power Piping Div. of Blaw-Knox Co., Beaver & Western Ave., Pittsburgh, Pa.
Tubular Service Corp., 32 Broadway, New York, N. Y.

PIPE BENDING MACHINES

American Pipe Bending Machine Co., Inc., 37-39 Pearl St., Boston, Mass.

PIPE CUTTING AND THREADING MACHINERY

Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown, O.
Barnes, W. F. and John, Co., Rockford, Ill.
Landis Machine Co., Waynesboro, Pa.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.
Taylor-Wilson Mfg. Co., 1200 Thomson Ave., McKees Rocks, Pa.

PIPE FITTINGS

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Flori Pipe Co., The, Red Bud & Bulwer Aves., St. Louis, Mo.
Grinnell Co., Inc., Providence, R. I.
Oil Well Supply Co., Dallas, Texas.
Watson-Stillman Co., Roselle, N. J.
Worthington Pump & Machinery Corp., Harrison, N. J.

PIPE LINES (Riveted or Welded)

Bethlehem Steel Co., Bethlehem, Pa.

PIPE MILL MACHINERY

Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown, O.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Taylor-Wilson Mfg. Co., 1200 Thomson Ave., McKees Rocks, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Yoder Co., The, 53 Walworth Ave., Cleveland, O.

PIPE STRAIGHTENING MACHINERY

Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown, O.
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Medart Co., The, 3520 DeKalb St., St. Louis, Mo.
Taylor-Wilson Mfg. Co., 1200 Thomson Ave., McKees Rocks, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PIPE TOOLS

Detroit Tap & Tool Co., 8432 Butler St., Detroit, Mich.
Greenfield Tap & Die Corp., Greenfield, Mass.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

PIPING CONTRACTORS

Grinnell Co., Inc., Providence, R. I.
Power Piping Co., Beaver and Western Ave., Pittsburgh, Pa.

PISTON RINGS

American Hammered Piston Ring Div., Koppers Co., Baltimore, Md.

PISTON RODS

Bliss & Laughlin, Inc., Harvey, Ill.
Heppenstall Co., Box S-12, 4620 Hatfield St., Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Kropp Forge Co., 5301 W. Roosevelt Rd., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Union Drawn Steel Div., Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., 1st National Bank Bldg. Pittsburgh, Pa.

PLANERS

Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Consolidated Machine Tool Corp., Winton & Blossom Rds., Rochester, N. Y.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Ohio Machine Tool Co., The, Kenton, O.
Sellers, William, & Co., Inc., 16th & Callowhill Sts., Philadelphia, Pa.

PLANT DISMANTLERS

Hetz Construction Co., Warren, O.

PLATES (Aluminum or Magnesium)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
Dow Chemical Co., The, Midland, Mich.

PLATE CASTORS

Hyatt Bearings Div., General Motors Corp., Harrison, N. J.

PLATE LIFTING GRIPS

Downs Crane & Hoist Co., 540 W. Vernon Ave., Los Angeles, Calif.

PLATES (Lapping)

Smith Tool & Engineering Co., The, 857 N. Sandusky Ave., Bucyrus, O.

PLATES (Sheared or Universal) (*Also Stainless)

*Alan Wood Steel Co., Conshohocken, Pa.
*Allegheny Ludlum Steel Corp., Dept. S-5, Brackenridge, Pa.
*American Rolling Mill Co., The, 1411 Curtis St., Middletown, O.
*Bethlehem Steel Co., Bethlehem, Pa.
Calcos Steel & Iron Co., 1332 North 30th St., Philadelphia, Pa.
*Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
International Nickel Co., Inc., The, 67 Wall St., New York City
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Smith, David, Steel Co., Inc., 234—46th St., Brooklyn, N. Y.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
*United States Steel Supply Co., 1316 Wabansia Ave., Chicago, Ill.
Worth Steel Co., Claymont, Del.
Youngstown Sheet & Tube Co., The, Youngstown, O.

PLATES (Stainless Clad)

Allegheny Ludlum Steel Corp., Dept. S-3, Brackenridge, Pa.
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.

PLATES (Steel—Floor)—See FLOORING (Steel)

PLATES (Terne and Tin)—See TIN or TERNE PLATE

PLATING EQUIPMENT

Chicago Wheel & Mfg. Co., Dept. ST-7, 1101 W. Monroe St., Chicago, Ill.
Heil Engineering Co., 12903 Elmwood Ave., Cleveland, O.
MacDermid, Inc., Waterbury, Conn.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

PLATING SUPPLIES

Turco Products, Inc., 6135 S. Central Ave., Los Angeles, Cal.
United Chromium, Inc., 51 E. 42nd St., New York City

PLUGS (Expansion)

Hubbard, M. D., Spring Co., 707 Central Ave., Pontiac, Mich.

PLUGS (Rolling Mill)

Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

POLE LINE MATERIAL

Graybar Electric Co., 420 Lexington Ave., New York City
Oliver Iron & Steel Corp., S. 10th & Muriel Sts., Pittsburgh, Pa.

POLES (Tubular Steel)

National Tube Co., Frick Bldg., Pittsburgh, Pa.

PORTABLE TOOLS AND ACCESSORIES

Chicago Wheel & Manufacturing Co., Dept. ST-7, 1101 W. Monroe St., Chicago, Ill.
Graybar Electric Co., 420 Lexington Ave., New York City
Syntron Co., Homer City, Pa.

POTENTIOMETERS

Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

POTS (Case Hardening)

Pressed Steel Tank Co., 1461 S. 66th St., Milwaukee, Wis.

POTS (Melting)

American Brake Shoe & Fdry Co., Brake Shoe & Castings Div., 230 Park Ave., New York City.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.

POWDERED METAL PRODUCTS

Mallory, P. R., & Co., 3029 E. Washington Ave., Indianapolis, Ind.

POWER PLANTS (Diesel, Gas Engine, Steam)

Ready-Power Co., The, 3842 Grand River Ave., Detroit, Mich.

POWER UNITS (Gasoline, Electric, for Industrial Trucks)

Ready-Power Co., The, 3842 Grand River Ave., Detroit, Mich.

PREHEATERS

Babcock & Wilcox Co., The, 85 Liberty St., New York City.
Salem Engineering Co., 714 S. Broadway, Salem, O.

PRESS BRAKES

Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.
Cleveland Crane & Engineering Co., The, Steelweld Machinery Div., The, 1125 E. 283rd St., Wickliffe, O.
Ferracute Machine Co., Bridgeton, N. J.

PRESSED METAL PARTS

American Brass Co., The, 25 Broadway, New York City.
Stanley Works, The, Pressed Metal Div., New Britain, Conn.

PRESSES

Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Beatty Machine & Mfg. Co., Hammond, Ind.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Colonial Broach Co., P.O. Box No. 37, Harper Sta., Detroit, Mich.
Denison Engineering Co., The, 1163 Dublin Rd., Columbus, O.
Erie Foundry Co., Erie, Pa.
Farquhar, A. B., Co., Ltd., 195 Duke St., York, Pa.
Ferracute Machine Co., Bridgeton, N. J.
Galland-Henning Manufacturing Co., 2747 S. 31st St., Milwaukee, Wis.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Streine Tool & Mfg. Co., New Bremen, O.
Taylor-Wilson Mfg. Co., 1200 Thomson Ave., McKees Rocks, Pa.
Tomkins-Johnson Co., The, Dept. S, 611 N. Mechanic St., Jackson, Mich.
Watson-Stillman Co., Roselle, N. J.

PRESSES (Bending)

Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Beatty Machine & Mfg. Co., Hammond, Ind.
Cleveland Crane & Engineering Co., The, Steelweld Machinery Div., The, 1125 E. 283rd St., Wickliffe, O.
Denison Engineering Co., The, 1163 Dublin Rd., Columbus, O.
Ferracute Machine Co., Bridgeton, N. J.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Watson-Stillman Co., Roselle, N. J.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Extrusion)

Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Beatty Machine & Mfg. Co., Hammond, Ind.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Hydropress, Inc., 570 Lexington Ave., New York City.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Watson-Stillman Co., Roselle, N. J.

PRESSES (Forging)

Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Erie Foundry Co., Erie, Pa.
Farquhar, A. B., Co., Ltd., 195 Duke St., York, Pa.
Ferracute Machine Co., Bridgeton, N. J.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Hydropress, Inc., 570 Lexington Ave., New York City.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National Machinery Co., The, Tiffin, O.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PRESSES (Forming and Braking)

Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Beatty Machine & Mfg. Co., Hammond, Ind.
Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.
Cleveland Crane & Engineering Co., The, Steelweld Machinery Div., The, 1125 E. 283rd St., Wickliffe, O.
Farquhar, A. B., Co., Ltd., 195 Duke St., York, Pa.
Ferracute Machine Co., Bridgeton, N. J.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Hydraulic)

Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Beatty Machine & Mfg. Co., Hammond, Ind.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Colonial Broach Co., P.O. Box No. 37, Harper Sta., Detroit, Mich.
Denison Engineering Co., The, 1163 Dublin Rd., Columbus, O.
Erie Foundry Co., Erie, Pa.
Farquhar, A. B., Co., Ltd., 195 Duke St., York, Pa.
Galland-Henning Manufacturing Co., 2747 S. 31st St., Milwaukee, Wis.
Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago, Ill.
Hydraulic Machinery Inc., The, 12825 Ford Rd., Dearborn, Mich.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Hydropress, Inc., 570 Lexington Ave., New York City.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Progressive Welder Co., 3050 E. Outer Drive, Detroit, Mich.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Watson-Stillman Co., Roselle, N. J.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.

PRESSES (Pneumatic)

Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago, Ill.

PRESSES (Punching, Drawing, Coining, Blanking, etc.)

Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Beatty Machine & Mfg. Co., Hammond, Ind.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Farquhar, A. B., Co., Ltd., 195 Duke St., York, Pa.
Ferracute Machine Co., Bridgeton, N. J.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Progressive Welder Co., 3050 E. Outer Drive, Detroit, Mich.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Riveting)

Ferracute Machine Co., Bridgeton, N. J.
Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago, Ill.

PRESSES (Stamping)

Ferracute Machine Co., Bridgeton, N. J.
Matthews, Jas. H., & Co., 3978 Forbes St., Pittsburgh, Pa.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES, BRIQUETTING (Turnings & Borings)

Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Watson-Stillman Co., Roselle, N. J.

PRESSURE VESSELS

Babcock & Wilcox Co., The, 85 Liberty St., New York City.
Scaife Co., Ann St., Oakmont, Pa.
Struthers Wells Corp., Titusville, Pa.

PROJECTILE BANDS

Lewin-Mathes Co., Chouteau Ave. at Twelfth St., St. Louis, Mo.

PUG MILLS

Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.

PULLEYS (Magnetic)

Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

PULVERIZERS

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Pulverizer Co., 1539 Macklind Ave., St. Louis, Mo.
Babcock & Wilcox Co., The, 85 Liberty St., New York City.
Gruendler Crusher & Pulverizer Co., 2915-17 N. Market St., St. Louis, Mo.

PUMPHOUSES

Dravo Corp., (Contracting Div.) Neville Island, Pittsburgh, Pa.

PUMPS

Aldrich Pump Co., 2 Gordon St., Allentown, Pa.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Brake Shoe Co., American Manganese Steel Div., 389 E. 14th St., Chicago, Ill.
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.
Hydropress, Inc., 570 Lexington Ave., New York City.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Oil Well Supply Co., Dallas, Texas.
Roper, The Geo. D., Corp., Rockford, Ill.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Boiler Feed)

Aldrich Pump Co., 2 Gordon St., Allentown, Pa.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.
Hills-McCanna Co., 2434 Nelson St., Chicago, Ill.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Centrifugal)

Aldrich Pump Co., 2 Gordon St., Allentown, Pa.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Brown & Sharpe Mfg. Co., Providence, R. I.
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Fuel Injection)

Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

PUMPS (High Pressure)

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Hills-McCanna Co., 2434 Nelson St., Chicago, Ill.
Hydropress, Inc., 570 Lexington Ave., New York City
Roper, Geo. D., Corp., The, Rockford, Ill.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Hydraulic)

Aldrich Pump Co., 2 Gordon St., Allentown, Pa.
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Brown & Sharpe Mfg. Co., Providence, R. I.
Denison Engineering Co., The, 1163 Dublin Rd., Columbus, O.
Farquhar, A. B., Co., Ltd., 195 Duke St., York, Pa.
Galland-Henning Manufacturing Co., 2747 S. 31st St., Milwaukee, Wis.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Hydropress, Inc., 570 Lexington Ave., New York City.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Racine Tool & Machine Co., Racine, Wis.
Roper, The Geo. D., Corp., Rockford, Ill.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Vickers Inc., 1480 Oakman Blvd., Detroit, Mich.
Watson-Stillman Co., Roselle, N. J.
Weinman Pump & Supply Co., The, 207-209 Blvd. of the Allies, Pittsburgh, Pa.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Metering)

Hills-McCanna Co., 2434 Nelson St., Chicago, Ill.

PUMPS (Reciprocating)

Aldrich Pump Co., 2 Gordon St., Allentown, Pa.
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.
Hills-McCanna Co., 2434 Nelson St., Chicago, Ill.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Rotary)

Brown & Sharpe Mfg. Co., Providence, R. I.
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.
Roper, The Geo. D., Corp., Rockford, Ill.
Vickers, Inc., 1480 Oakman Blvd., Detroit, Mich.
Weinman Pump & Supply Co., The, 207-209 Boulevard of the Allies, Pittsburgh, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Vacuum)

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Vertical Turbine)

Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.
Layne & Bowler, Inc., Memphis, Tenn.
Watson-Stillman Co., Roselle, N. J.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUNCHES (Multiple)

Beatty Machine & Mfg. Co., Hammond, Ind.
Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Consolidated Machine Tool Corp., Winton & Blossom Rds., Rochester, N. Y.
Ferracute Machine Co., Bridgeton, N. J.
Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago, Ill.

PUNCHING AND SHEARING MACHINERY

Beatty Machine & Mfg. Co., Hammond, Ind.
Buffalo Forge Co., 158 Mortimer St., Buffalo, N. Y.
Chambersburgh Engineering Co., Chambersburg, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Consolidated Machine Tool Corp., Winton & Blossom Rds., Rochester, N. Y.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Ferracute Machine Co., Bridgeton, N. J.
Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Watson-Stillman Co., Roselle, N. J.
Wean Engineering Co., Inc., The, Warren, O.

PYROMETER TUBES

Carborundum Co., The, Niagara Falls, N. Y.
Norton Company, Worcester, Mass.

PYROMETERS

Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

RACKS (Foundry Core)

Chase Fdry. & Mfg. Co., 2300 S. Parsons Ave., Columbus, O.

RAIL BREAKERS

National Roll & Foundry Co., The, Avonmore, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

RAILS (New and Relaying)

Dulien Steel Products, Inc., 414 First Ave. So., Seattle, Wash.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Midwest Steel Corporation, Charleston, W. Va.

RAILS (Steel)

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Ryerson, Jos. T. & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Smith, David, Steel Co., Inc., 234—46th St., Brooklyn, N. Y.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

REAMERS

Brown & Sharpe Mfg. Co., Providence, R. I.
Carboloy Co., Inc., 11141 E. 8 Mile Rd., Detroit, Mich.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland, O.
Genesee Tool Co., Fenton, Mich.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Greenfield Tap & Die Corp., Greenfield, Mass.

REBUILT EQUIPMENT

Albert, L., & Son, Whitehead Rd., Trenton, N. J.
General Blower Co., 404 N. Peoria St., Chicago, Ill.
Iron & Steel Products, Inc., Hegewisch Sta., Chicago, Ill.
Lang Machinery Co., 25th & A.V.R.R., Pittsburgh, Pa.
Mississippi Valley Equipment Co., 511 Locust St., St. Louis, Mo.
West Penn Machinery Co., 1208 House Bldg., Pittsburgh, Pa.

RECEIVERS

Pressed Steel Tank Co., 1461 S. 66th St., Milwaukee, Wis.
Scaife Co., Ann St., Oakmont, Pa.

RECORD KEEPING SYSTEMS

Diebold Safe & Lock Co., 818 Mulberry Rd., Canton, O.

RECORDERS (Combustion)

Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

RECORDERS (Pressure, Speed, Temperature, Time)

Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

RECTIFIERS (Dry Disc)

General Electric Co., Sec. A 333-90, Appliance & Merchandising Dept., Bridgeport, Conn.
Mallory, P. R., & Co., 3029 E. Washington Ave., Indianapolis, Ind.
Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.

RECTIFIERS (Mercury Arc)

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.

REDUCTION GEARS

Foote Bros. Gear & Machine Co., 5301 S. Western Blvd., Chicago, Ill.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1140 W. Monroe St., Chicago, Ill.
Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
Philadelphia Gear Works, Erie Ave. & G St., Philadelphia, Pa.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co., 200 McCandless Ave., Pittsburgh, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

REFRACTORIES (Chrome)

Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.

REFRACTORIES (Dolomite)

Basic Refractories, Inc., Hanna Bldg., Cleveland, O.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.

REFRACTORIES (Fire Clay)

Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Eureka Fire Brick Works, 1100 B. F. Jones Law Bldg., Pittsburgh, Pa.
Globe Brick Co., The, East Liverpool, O.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Laclede-Christy Clay Products Co., Ambassador Bldg., St. Louis, Mo.
National Fireproofing Corp., 202 E. Ohio St., Pittsburgh, Pa.

REFRACTORIES (For High Frequency Furnaces)

Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Carborundum Co., The, Perth Amboy, N. J.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.
Johns-Manville Corp., 22 E. 40th St., New York City
Norton Co., Worcester, Mass.
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.

REFRACTORIES (Forsterite)

Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.

REFRACTORIES (High Alumina)

Carborundum Co., The, Niagara Falls, N. Y.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.
Laclede-Christy Clay Products Co., Ambassador Bldg., St. Louis, Mo.

REFRACTORIES (Insulating)

Carborundum Co., The, Niagara Falls, N. Y.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.
Johns-Manville Corp., 22 E. 40th St., New York City
Laclede-Christy Clay Products Co., Ambassador Bldg., St. Louis, Mo.

REFRACTORIES (Magnesia)

Basic Refractories, Inc. Hanna Bldg., Cleveland, O.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.

REFRACTORIES (Magnesite)

Basic Refractories, Inc., Hanna Bldg., Cleveland, O.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.,

REFRACTORIES (Plastic)

Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Basic Refractories, Inc. Hanna Bldg., Cleveland, O.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.,
Johns-Manville Corp., 22 E. 40th St., New York City
Laclede-Christy Clay Products Co., Ambassador Bldg., St. Louis, Mo.

REFRACTORIES (Silica)

Carborundum Co., The, Niagara Falls, N. Y.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.

REFRACTORIES (Silicon Carbide)

Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., The, Perth Amboy, N. J.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.
Norton Co., Worcester, Mass.

REFRACTORY CEMENT AND CONCRETE

Atlas Lumnite Cement Co., Dept. S., Chrysler Bldg., New York City.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Carborundum Co., The, Niagara Falls, N. Y.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.,
Johns-Manville Corp., 22 E. 40th St., New York City.
National Fireproofing Corp., 202 E. Ohio St., Pittsburgh, Pa.
Quigley Co., Inc. 56 W. 45th St., New York City

REFRIGERATION EQUIPMENT (Industrial)

Kold-Hold Co., 444 North Grand Ave., Lansing, Mich.

REGULATORS (Pressure)

Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

REGULATORS (Temperature)

Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The 118 Neponset Ave., Foxboro, Mass.
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

REGULATORS (Voltage)

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.

REINFORCEMENT FABRIC (Electric Welded)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

RELAYS (Magnetic)

Ward Leonard Electric Co., 65 South St., Mt. Vernon, N. Y.

RESISTORS (Alloy Grid or Wire Wound—Electric)

Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.

RESISTORS (Graphite Disc)

Allen-Bradley Co., 1316 S. 2nd St., Milwaukee, Wis.

RHEOSTATS

Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.
Ward Leonard Electric Co., 65 South St., Mt. Vernon, N. Y.

RINGS (Aluminum, Brass, Bronze)

Shenango-Penn Mold Co., 411 W. Third St., Dover, O.

RINGS (Steel)

Commercial Forgings Co., The, 3700 E. 91st St., Cleveland, O.
Heppenstall Co., Box S-12, 4620 Hatfield St., Pittsburgh, Pa.
King Fifth Wheel Co., 2915 N. Second St., Philadelphia, Pa.

RINGS (Steel)—Cont.

Kropp Forge Co., 5301 W. Roosevelt Rd., Chicago, Ill.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

RINGS (Weldless) (*Also Stainless)

Commercial Forgings Co., The, 3700 E. 91st St., Cleveland, O.
*Midvale Co., The, Nicetown, Philadelphia, Pa.

RIVETERS (Hydraulic—Portable and Stationary)

Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago, Ill.

RIVETERS (Pneumatic)

Cleveland Pneumatic Tool Co., 3781 E. 77th St., Cleveland, O.
Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago, Ill.

RIVETING MACHINERY

Chambersburg Engineering Co., Chambersburg, Pa.
Shuster, F. B., Co., Inc., New Haven, Conn.
Tomkins-Johnson Co., Dept. S, 611 N. Mechanic St., Jackson, Mich.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

RIVETS (*Also Stainless)

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., 527 Carnegie Bldg., Pittsburgh, Pa.
Champion Rivet Co., The, 11200 Harvard Ave., Cleveland, O.
*Harper, H. M., Co., The, 2646 Fletcher St., Chicago, Ill.
*Hassall, John, Inc., 402 Oakland St., Brooklyn, N. Y.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
*Oliver Iron & Steel Corp., S. 10th & Muriel Sts., Pittsburgh, Pa.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
*Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Triplex Screw Co., The, 5341 Grant Ave., Cleveland, O.

RIVETS (Nonferrous)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
Harper, H. M., Co., The, 2646 Fletcher St., Chicago, Ill.

RODS (Alloy)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Ampco Metal, Inc., Dept. S-7, 3830 W. Burnham St., Milwaukee, Wis.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Carpenter Steel Co., 139 Bern St., Reading, Pa.
Copperweld Steel Co., Warren, O.
International Nickel Co., Inc., The, 67 Wall St., New York City
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.

RODS (Aluminum or Magnesium)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
Dow Chemical Co., The, Midland, Mich.
Bohn Aluminum & Brass Corp., Lafayette Bldg., Detroit, Mich.

RODS (Brass, Bronze, Phosphor Bronze, Silicon Bronze, Copper, Nickel Silver)

American Brass Co., The, 25 Broadway, New York City.
Bridgeport Brass Co., Bridgeport, Conn.
Bristol Brass Corp., The, Bristol, Conn.
Mueller Brass Co., Port Huron, Mich.
Revere Copper & Brass Co., Inc., 230 Park Ave., New York City
Roebling's John A., Sons Co., Trenton, N. J.
Seymour Manufacturing Co., The, Seymour, Conn.

RODS (Drill)

Allegheny Ludlum Steel Corp., Dept. S-5, Brackenridge, Pa.
Anchor Drawn Steel Co., Latrobe, Pa.
Carpenter Steel Co., 139 Bern St., Reading, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Purdy, A. R., Co., Inc., 792 Greenwich St., New York City.
Sandvik Steel, Inc., New York City.

RODS (Iron and Steel)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.

RODS (Rounds, Flats and Shapes) (*Also Stainless)

*Allegheny Ludlum Steel Corp., Dept. S-5, Brackenridge, Pa.
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
*Copperweld Steel Co., Warren, O.
*Firth-Sterling Steel Co., McKeesport, Pa.
International Nickel Co., Inc., The, 67 Wall St., New York City
*Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Washburn Wire Co., Phillipsdale, R. I.
Youngstown Sheet & Tube Co., The, Youngstown, O.

RODS (Wire)—See WIRE PRODUCTS

ROLL FORMING MACHINES

Etna Machine Co., The, 3400 Maplewood Ave., Toledo, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Wean Engineering Co., Inc., The, Warren, O.
Yoder Co., The, 55 Walworth Ave., Cleveland, O.

ROLL HEATERS—See HEATERS (Electric Roll)

ROLLING DOORS & SHUTTERS—See DOORS AND SHUTTERS

ROLLING MILL BEARINGS—See BEARINGS (Rolling Mill)

ROLLING MILL ENGINEERS (Consulting and Contracting)

Hydropress, Inc., 570 Lexington Ave., New York City.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.

ROLLING MILL EQUIPMENT

Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown, O.
Alliance Machine Co., The, Alliance, O.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Cold Metal Products Co., The, 2131 Wilson Ave., Youngstown, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Hydropress, Inc., 570 Lexington Ave., New York City.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
Morgan Engineering Co., The, Alliance, O.
National Roll & Foundry Co., The, Avonmore, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Streine Tool & Mfg. Co., New Bremen, O.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Wean Engineering Co., Inc., The, Warren, O.

ROLLING MILL MACHINERY (Used)

Foster, Frank B., Oliver Bldg., Pittsburgh, Pa.

ROLLING MILL TABLES

Hydropress, Inc., 570 Lexington Ave., New York City.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.

ROLLS (Bending and Straightening)

Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago, Ill.
Wean Engineering Co., Inc., The, Warren, O.
Webb Corp., The, Webb City, Mo.

ROLLS (Iron and Steel)

Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Commercial Forgings Co., The, 3700 E. 91st St., Cleveland, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Fdry. and Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Medart Co., The, 3520 DeKalb St., St. Louis, Mo.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Roll & Fdry. Co., The, Avonmore, Pa.
Ohio Steel Foundry Co., Lima, O.-Springfield, O.
Pittsburgh Rolls Div., Blaw-Knox Co., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

ROLLS (Sand and Chilled)

Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown, O.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Ohio Steel Foundry Co., Lima, O.-Springfield, O.
Pittsburgh Rolls Div. of Blaw-Knox Co., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

ROLLS (Tinning Machine)

American Shear Knife Co., P.O. Box 353, Homestead, Pa.

ROOFING, SIDING & FLASHING

Globe Iron Roofing & Corrugating Co., The, Newport, Ky.
Johns-Manville Corp., 22 E. 40th St., New York City.
Mahon, The R. C., Co., 8650 Mt. Elliott Ave., Detroit, Mich.
Newport Rolling Mill Co., The, Newport, Ky.
Protected Steel Products Co., 33 Pride St., Pittsburgh, Pa.
Reeves Steel & Mfg. Co., Dover, O.
Wean Engineering Co., Inc., The, Warren, O.

ROOFING AND SIDING (Corrugated and Plain)

American Rolling Mill Co., The, 1411 Curtis St., Middletown, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh, Pa.
New Jersey Zinc Co., 160 Front St., New York City.
Reeves Steel & Mfg. Co., Dover, O.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Sons, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

ROOFING (Plastic and Liquid)

Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

RUBBER LINING (Hard and Soft)

United States Rubber Co., Mechanical Goods Div., 1230 Sixth Ave., New York City.

RUST PREVENTIVES

Alrose Chemical Co., 180 Mill St., Providence, R. I.
Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia, Pa.
International Rustproof Corp., 12507 Plover Ave., Lakewood, O.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.
Magnus Chemical Co., Inc., 206 South Ave., Garwood, N. J.
Smith Oil & Refining Co., Rockford, Ill.

RUST PROOFING PROCESSES AND EQUIPMENT

Alrose Chemical Co., 180 Mill St., Providence, R. I.
Detroit Rex Products Co., 13029 Hillview Ave., Detroit, Mich.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
International Rustproof Corp., 12507 Plover Ave., Lakewood, O.
Mahon, The R. C., Co., 8650 Mt. Elliott Ave., Detroit, Mich.
Oakite Products, Inc., 22 Thames St., New York City.
Turco Products, Inc., 6135 S. Central Ave., Los Angeles, Cal.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

SAFE ENDS (Boiler Tube)

National Tube Co., Frick Bldg., Pittsburgh, Pa.
Tubular Service Corp., 32 Broadway, New York, N. Y.

SAFETY DEVICES (Electric)

Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.

SAFETY EQUIPMENT

Mahon, The R. C., Co., 8650 Mt. Elliott Ave., Detroit, Mich.
Welding Engineering Co., 264 E. Ogden Ave., Milwaukee, Wis.

SALT TABLETS

Morton Salt Co., 310 S. Michigan Ave., Chicago, Ill.

SAND BLAST EQUIPMENT
American Foundry Equipment Co., The, 509 S. Byrkit St., Mishawaka, Ind.
Pangborn Corporation, Hagerstown, Md.

SAND CONDITIONING AND PREPARING MACHINERY
Allis-Chalmers Mfg. Co., Lincoln Ave., Berea, O.
American Foundry Equipment Co., The, 509 S. Byrkit St., Mishawaka, Ind.
Jeffrey Mfg. Co., 889-99 N. Fourth St., Columbus, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

SAWING MACHINES (Contour)
Continental Machines, Inc., 1324 Washington Ave., Minneapolis, Minn.

SAWING MACHINES (Hack)
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago, Ill.
Racine Tool & Machine Co., Racine, Wis.

SAWING MACHINES (Hot and Cold)
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago, Ill.
Consolidated Machine Tool Corp., Winton & Blossom Rds., Rochester, N. Y.
Morgan Engineering Co., The, Alliance, O.
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.
Racine Tool & Machine Co., Racine, Wis.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Wells Mfg. Co., Three Rivers, Mich.

SAWS (Band—Metal Cutting)
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago, Ill.
Atkins, E. C., & Co., 427 S. Illinois St., Indianapolis, Ind.
Continental Machines, Inc., 1324 Washington Ave., Minneapolis, Minn.
Delta Mfg. Co., The, 620 E. Vienna Ave., Milwaukee, Wis.
Disston, Henry, & Sons, Inc., 726 Tacony, Philadelphia, Pa.
Simonds Saw & Steel Co., 1350 Columbia Rd., Boston, Mass.
Wells Mfg. Co., Three Rivers, Mich.

SAWS (Hack)
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago, Ill.
Atkins, E. C., & Co., 427 S. Illinois St., Indianapolis, Ind.
Disston, Henry, & Sons, Inc., 726 Tacony, Philadelphia, Pa.
Simonds Saw & Steel Co., 1350 Columbia Rd., Boston, Mass.

SAWS (Hot & Cold)
Atkins, E. C., & Co., 427 S. Illinois St., Indianapolis, Ind.
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.

SAWS (Inserted Tooth, Cold)
Disston, Henry, & Sons, Inc., 726 Tacony, Philadelphia, Pa.
Simonds Saw & Steel Co., 1350 Columbia Rd., Boston, Mass.

SAWS (Metal Cutting)
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago, Ill.
Atkins, E. C., & Co., 427 S. Illinois St., Indianapolis, Ind.
Brown & Sharpe Mfg. Co., Providence, R. I.
Continental Machines, Inc., 1324 Washington Ave., Minneapolis, Minn.
Delta Mfg. Co., The, 620 E. Vienna Ave., Milwaukee, Wis.
Disston, Henry, & Sons, Inc., 726 Tacony, Philadelphia, Pa.
Genesee Tool Co., Fenton, Mich.
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.
Simonds Saw & Steel Co., 1350 Columbia Rd., Boston, Mass.
Walker-Turner Co., Inc., 5013 Berckman St., Plainfield, N. J.
Wells Mfg. Co., Three Rivers, Mich.

SAWS (Segmental)
Atkins, E. C., & Co., 427 S. Illinois St., Indianapolis, Ind.
Disston, Henry, & Sons, Inc., 726 Tacony, Philadelphia, Pa.
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.
Simonds Saw & Steel Co., 1350 Columbia Rd., Boston, Mass.

SCAFFOLDING (Tubular)
Dravo Corp. (Machinery Div.) 300 Penn Ave., Pittsburgh, Pa.

SCALES
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.

SCALES (Dial & Recording)
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.

SCALES (Laboratory)
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.

SCALES (Monorail)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

SCREENS AND SIEVES
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Chicago Perforating Co., 2443 W. 24th Pl., Chicago, Ill.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.
Hendrick Mfg. Co., Carbondale, Pa.
Koppers Co., Engineering & Construction Div., 300 Koppers Bldg., Pittsburgh, Pa.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

SCREENS (Vibrating)
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.

SCREW EXTRACTORS
Greenfield Tap & Die Corp., Greenfield, Mass.

SCREW MACHINE PRODUCTS
Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
Hindley Mfg. Co., Valley Falls, R. I.
Mueller Brass Co., Port Huron, Mich.
National Acme Co., The, 170 E. 131st St., Cleveland, O.

SCREW MACHINES (Automatic, Single and Multiple Spindle)
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Automatic Machine Co., 2269 Ashland Ave., Cleveland, O.
Cone Automatic Machine Co., Inc., Windsor, Vt.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.
Sheffield Corp., The, 721 Springfield St., Dayton, O.

SCREW PLATES
Greenfield Tap & Die Corp., Greenfield, Mass.

SCREW STOCK—See STEEL (Screw Stock)

SCREWS (Cap, Set, Safety-Set)
Cleveland Cap Screw Co., 2917 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Oliver Iron & Steel Corp., S. 10th & Muriel Sts., Pittsburgh, Pa.
Parker-Kalon Corp., 194-200 Varick St., New York City.
Triplex Screw Co., 5341 Grant Ave., Cleveland, O.

SCREWS (Cold Headed)
American Screw Co., Providence, R. I.
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Cleveland Cap Screw Co., 2917 E. 79th St., Cleveland, O.
Hassall, John, Inc., 402 Oakland St., Brooklyn, N. Y.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Oliver Iron & Steel Corp., S. 10th & Muriel Sts., Pittsburgh, Pa.

SCREWS (Conveyor)
Lee Spring Co. Inc., 30 Main St., Brooklyn, N. Y.
Link-Belt Co., 2410 W. 18th St., Chicago, Ill.

SCREWS (Hardened Metallic Drive)
American Screw Company, Providence, R. I.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Hardened Self-Tapping)
American Screw Co., Providence, R. I.
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Machine)
American Screw Co., Providence, R. I.
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Triplex Screw Co., 5341 Grant Ave., Cleveland, O.

SCREWS (Machine, Recessed Head)
American Screw Co., Providence, R. I.
Bristol Co., Waterbury, Conn.
Central Screw Co., Chicago, Ill.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
International Screw Co., Detroit, Mich.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
New England Screw Co., Keene, N. H.
Parker-Kalon Corp., 194-200 Varick St., New York City.
Pawtucket Screw Co., Pawtucket, R. I.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Mfg. Co., Waterbury, Conn.

SCREWS (Nonferrous and Stainless)
Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
American Screw Co., Providence, R. I.
Harper, H. M., Co., The, 2646 Fletcher St., Chicago, Ill.
Hassall, John, Inc., 402 Oakland St., Brooklyn, N. Y.

SCREWS (Sheet Metal, Recessed Head)
American Screw Co., Providence, R. I.
Bristol Co., Waterbury, Conn.
Central Screw Co., Chicago, Ill.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Shakeproof Lock Washer Co., Chicago, Ill.

SCREWS (Socket, Cold Forged)
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Thread Cutting)
American Screw Co., Providence, R. I.
Parker-Kalon Corp., 194-200 Varick St., New York City

SCREWS (Thumb)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Wood, Recessed Head)
American Screw Co., Providence, R. I.
Bristol Co., Waterbury, Conn.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Parker, Charles, Co., The, Meriden, Conn.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Southington Hardware Mfg. Co., Southington, Conn.
Whitney Screw Co., Nashua, N. H.

SCRUBBERS (Gas or Air)—see GAS SCRUBBERS

SEALS (Oil and Grease)
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Detroit, Mich.
Syntron Co., Homer City, Pa.

SEAMLESS STEEL TUBING—See TUBING (Seamless Steel)

SEPARATORS (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.

SHAFT HANGERS—See HANGERS

SHAFTING
American Brass Co., The, 25 Broadway, New York City.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bliss & Laughlin, Inc., Harvey, Ill.
Commercial Forgings Co., The, 3700 E. 91st St., Cleveland, O.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Union Drawn Steel Div., Republic Steel Corp., Massillon, O.
United States Steel Supply Co., 1316 Wabansia Ave., Chicago, Ill.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

SHAFTING (Flexible)
Walker-Turner Co., Inc., 5013 Berckman St., Plainfield, N. J.

SHAPERS

Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Ohio Machine Tool Co., The, Kenton, O.

SHAPERS (Spindle)

Walker-Turner Co., Inc., 5013 Berckman St., Plainfield, N. J.

SHAPES (Magnesium)

Dow Chemical Co., The, Midland, Mich.

SHAPES (Steel)

Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Pressed Steel Tank Co., 1461 S. 66th St., Milwaukee, Wis.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Union Drawn Steel Div., Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

SHEAR BLADES

American Shear Knife Co., P.O. Box 355, Homestead, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Disston, Henry, & Sons, Inc., 726 Taconv, Philadelphia, Pa.
Heppenstall Co., Box S-12, 4620 Hatfield St., Pittsburgh, Pa.
Hill Acme Co., 6400 Breakwater Ave., Cleveland, O.
Ohio Knife Co., B. & O. R.R. & Dreman Ave., Cincinnati, O.
Simonds Saw & Steel Co., 1350 Columbia Rd., Boston, Mass.

SHEARS

Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown, O.
Beatty Machine & Mfg. Co., Hammond, Ind.
Buffalo Forge Co., 158 Mortimer St., Buffalo, N. Y.
Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Consolidated Machine Tool Corp., Winton & Blossom Rds., Rochester, N. Y.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hill Acme Co., 6400 Breakwater Ave., Cleveland, O.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Fdry. & Mach. Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
O'Neil-Irwin Mfg. Co., 304 8th Ave. S. Minneapolis, Minn.
Streine Tool & Mfg. Co., New Bremen, O.
Thomas Machine Mfg. Co., Etna Branch P. O. Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Watson-Stillman Co., Roselle, N. J.

SHEARS, ROTARY (Slitting, Beveling, Circling, Flanging)

Consolidated Machine Tool Corp., Winton & Blossom Rds., Rochester, N. Y.
Hydropress, Inc., 570 Lexington Ave., New York City.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Simonds Saw & Steel Co., 1350 Columbia Rd., Boston, Mass.
Wean Engineering Co., Inc., The, Warren, O.
Yoder Co., The, 55 Walworth Ave., Cleveland, O.

SHEET BARS

Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

SHEET LIFTERS AND CARRIERS

American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago, Ill.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
J-B Engineering Sales Co., 3100 East St., New Haven, Conn.

SHEET METAL PRODUCTS—See STAMPINGS

SHEET METAL WORKERS MACHINES

Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Streine Tool & Mfg. Co., New Bremen, O.

SHEET STEEL PILING (New and Used)

American Rolling Mill Co., The, 1411 Curtis St., Middletown, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.

SHEETS (Acid Resisting)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
International Nickel Co., Inc., The, 67 Wall St., New York City.

SHEETS (Black)

Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., 327 Carnegie Bldg., Pittsburgh, Pa.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Newport Rolling Mill Co., The, Newport, Ky.
Reeves Steel & Mfg. Co., Dover, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Smith, David, Steel Co., Inc., 234—46th St., Brooklyn, N. Y.
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Aluminum or Magnesium)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
Dow Chemical Co., The, Midland, Mich.

SHEETS (Brass, Bronze, Phosphor Bronze, Silicon-Bronze, Copper, Nickel, Nickel Silver)

American Brass Co., The, 25 Broadway, New York City.
Bridgeport Brass Co., Bridgeport, Conn.
Bristol Brass Corp., The, Bristol, Conn.
International Nickel Co., Inc., The, 67 Wall St., New York City.
Revere Copper & Brass Co., Inc., 230 Park Ave., New York City
Seymour Manufacturing Co., The, Seymour, Conn.
Western Cartridge Co., Brass Mill Div., East Alton, Ill.

SHEETS (Corrugated)

American Rolling Mill Co., The, 1411 Curtis St., Middletown, O.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Globe Iron Roofing & Corrugating Co., The, Newport, Ky.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh, Pa.
Newport Rolling Mill Co., The, Newport, Ky.
Reeves Steel & Mfg. Co., Dover, O.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Smith, David, Steel Co., Inc., 234—46th St., Brooklyn, N. Y.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

SHEETS (Deep Drawing and Stamping)

Alan Wood Steel Co., Conshohocken, Pa.
Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 1411 Curtis St., Middletown, O.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
General Steel Warehouse Co., Inc., 1840 N. Kostner Ave., Chicago, Ill.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Newport Rolling Mill Co., The, Newport, Ky.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Smith, David, Steel Co., Inc., 234—46th St., Brooklyn, N. Y.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Electrical)

Allegheny Ludlum Steel Corp., Dept. S-5, Brackenridge, Pa.
American Rolling Mill Co., The, 1411 Curtis St., Middletown, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc. Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.
Newport Rolling Mill Co., The, Newport, Ky.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Galvanized)

American Rolling Mill Co., The, 1411 Curtis St., Middletown, O.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Newport Rolling Mill Co., The, Newport, Ky.
Reeves Steel & Mfg. Co., Dover, O.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Smith, David, Steel Co., Inc., 234—46th St., Brooklyn, N. Y.
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
United States Steel Supply Co., 1316 Wabansia Ave., Chicago, Ill.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.

SHEETS (High Finished)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 1411 Curtis St., Middletown, O.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Hot Rolled and Hot Rolled Annealed)

Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., The, 1411 Curtis St., Middletown, O.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Disston, Henry, & Sons, Inc., 726 Taconv, Philadelphia, Pa.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh, Pa.
Newport Rolling Mill Co., The, Newport, Ky.
Reeves Steel & Mfg. Co., Dover, O.

SHEETS (Hot Rolled and Hot Rolled Annealed)—Cont.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Smith, David, Steel Co., Inc., 234—46th St., Brooklyn, N. Y.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
United States Steel Supply Co., 1316 Wabansia Ave., Chicago, Ill.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Worth Steel Co., Claymont, Del.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Lead Coated)
Continental Steel Corp., Kokomo, Ind.
National Lead Co., 111 Broadway, New York City
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.

SHEETS (Long Terne)
American Rolling Mill Co., The, 1411 Curtis St., Middletown, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Steel Corp., Kokomo, Ind.
Newport Rolling Mill Co., The, Newport, Ky.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Smith, David, Steel Co., Inc., 234—46th St., Brooklyn, N. Y.
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Perforated)
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.

SHEETS (Roofing)—See ROOFING AND SIDING (Corrugated and Plain)

SHEETS (Stainless)
Allegheny Ludlum Steel Corp., Dept. S-3, Brackenridge, Pa.
American Rolling Mill Co., The, 1411 Curtis St., Middletown, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Jessop Steel Co., 584 Green St., Washington, Pa.
Republic Steel Corp., Massillon, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.

SHEETS (Stainless Clad)
Allegheny Ludlum Steel Corp., Dept. S-3, Brackenridge, Pa.
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.

SHEETS (TIN)—See TIN or TERNE PLATE

SHEETS (Tin Mill Black)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Newport Rolling Mill Co., The, Newport, Ky.
Reeves Steel & Mfg. Co., Dover, O.
Republic Steel Corp., Dept. ST, Cleveland, O
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHELL BANDS (Rotating)
Lewin-Mathes Co., Chouteau Ave. at Twelfth St., St. Louis, Mo.

SHELLS (Seamless Drawn)
Pressed Steel Tank Co., 1461 S. 66th St., Milwaukee, Wis.

SHIMS (Laminated)
Laminated Shim Co., Inc., 87 Union St., Glenbrook, Conn.

SHOVELS (Power)
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

SHRINKING EQUIPMENT (Metal)
Motor Products Corp., Deep Freeze Div., 2309 Davis St., N. Chicago, Ill.

SIEVES—See SCREENS AND SIEVES

SIGNALING & INTERCOMMUNICATION EQUIPMENT
Graybar Electric Co., 420 Lexington Ave., New York City.

SIGNS (Metal)
Webb Corp., The, Webb City, Mo.

SILICO-MANGANESE
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Samuel, Frank & Co., Inc., Harrison Bldg., Philadelphia, Pa.

SILICON BRONZE
Ajax Metal Co., Philadelphia, Pa.
American Brass Co., The, 25 Broadway, New York City.
Bohn Aluminum & Brass Corp., Lafayette Bldg., Detroit, Mich.
Bridgeport Brass Co., Bridgeport, Conn.

SILICON METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

SKELP (Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

SLAG GRANULATING MACHINES (Blast Furnace and Open Hearth)
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

SLEEVES (Piston, Pump & Shaft)
Shenango-Penn Mold Co., 411 W. Third St., Dover, O.

SLITTERS
Cowles Tool Co., 2086 W. 110th St., Cleveland, O.
Hill Acme Co., 6400 Breakwater Ave., Cleveland, O.
Ohio Knife Co., B. & O. R.R. & Dremen Ave., Cincinnati, O.
Simonds Saw & Steel Co., 1350 Columbia Rd., Boston, Mass.
Wean Engineering Co., Inc., The, Warren, O.
Yoder Co., The, 55 Walworth Ave., Cleveland, O.

SMALL TOOLS
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland, O.
Eliott Mfg. Co., Milford, Conn.

SOAKING PITS
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Blaw-Knox Co., Blawnox, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Surface Combustion Div. of General Properties Co., Inc., 2375 Dorr St., Toledo, O.

SOLDER
Bohn Aluminum & Brass Corp., Lafayette Bldg., Detroit, Mich.
Kester Solder Co., 4222 Wrightwood Ave., Chicago, Ill.
National Lead Co., 111 Broadway, New York City

SOLDERING EQUIPMENT
Lepel High Frequency Laboratories Inc., 39 W. 60th St., New York City.

SOLENOIDS (Electric)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
General Electric Co., Sec. H. 750-159, Schenectady, N. Y.

SOLVENT (Degreasing)
Detroit Rex Products Co., 13039 Hillview Ave., Detroit, Mich.
Oakite Products, Inc., 22 Thames St., New York City.
Pennsylvania Salt Mfg. Co., Dept. S. Pennsalt Cleaner Div., Philadelphia, Pa.

SOUND SYSTEMS
Stromberg-Carlson Co., 100 Carlson Rd., Rochester, N. Y.

SPACING TABLES
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.

SPECIAL MACHINERY—See MACHINERY (Special)

SPEED REDUCERS
Cleveland Worm & Gear Co., 3270 E. 80th St., Cleveland, O.
Foote, Brad, Gear Works, Cicero, Ill.
Foote Bros. Gear & Machine Co., 5301 S. Western Blvd., Chicago, Ill.
Grant Gear Works, 2nd & B. Sts., Boston, Mass.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1140 W. Monroe St., Chicago, Ill.
Jones, W. A., Fdry. & Mach. Co., 4437 Roosevelt Rd., Chicago, Ill.
Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
New Departure Div., General Motors Corp., Bristol, Conn.
Philadelphia Gear Works, Erie Ave. & G. St., Philadelphia, Pa.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.
Westinghouse Electric & Mfg. Co., 200 McCandless Ave., Pittsburgh, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

SPIEGELEISEN
Electro Metallurgical Co., 30 E. 42nd St., New York City.
New Jersey Zinc Co., 160 Front St., New York City.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

SPIKES (Screw)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Oliver Iron & Steel Corp., S. 10th & Muriel Sts., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

SPINDLES (Grinding)
Bryant Chucking Grinder Co., Springfield, Vt.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Heald Machine Co., Worcester, Mass.

SPINNINGS (Metal)
Milwaukee Metal Spinning Co., 3502 W. Pierce St., Milwaukee, Wis.

SPLICE BARS (Rail)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

SPRAY BOOTHS
Mahon, The R. C., Co., 8650 Mt. Elliott Ave., Detroit, Mich.

SPRINGS (*Also Stainless)
*Accurate Spring Mfg. Co., 3823 W. Lake St., Chicago, Ill.
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
*Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Hubbard, M. D., Spring Co., 707 Central Ave., Pontiac, Mich.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
*Raymond Mfg. Co., Div. Associated Spring Corp., 280 S. Centre St., Corry, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Washburn Wire Co., 118th St. & Harlem River, New York City.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

SPRINGS (Coil & Elliptic)
Accurate Spring Mfg. Co., 3823 W. Lake St., Chicago, Ill.
Barnes, Wallace Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 S. Centre St., Corry, Pa.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

SPRINGS (Compression)
Accurate Spring Mfg. Co., 3823 W. Lake St., Chicago, Ill.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 S. Centre St., Corry, Pa.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

SPRINGS (Flat Coiled)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Washburn Wire Co., 118th & Harlem River, New York City.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

SPRINGS (Oil Tempered—Flat)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Davis Brake Beam Co., Laurel Ave., & P. R. R., Johnstown, Pa.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 S. Centre St., Corry, Pa.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

SPRINGS (Torsion)
Accurate Spring Mfg. Co., 3823 W. Lake St., Chicago, Ill.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 S. Centre St., Corry, Pa.

SPRINGS (Valve)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 S. Centre St., Corry, Pa.

SPRINKLERS (Automatic)
Grinnell Co., Inc., Providence, R. I.

SPROCKETS

Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

SPRUE CUTTERS

Buffalo Forge Co., 158 Mortimer St., Buffalo, N. Y.
Consolidated Machine Tool Corp., Winton & Blossom Rds., Rochester, N. Y.
Ferracute Machine Co., Bridgeton, N. J.
Shuster, F. B., Co., The, New Haven, Conn.

STABILIZING EQUIPMENT (Temperature)

Motor Products Corp., Deep Freeze Div., 2309 Davis St., N. Chicago, Ill.

STACKS (Steel)—See BRIDGES, ETC.

STAINLESS STEEL—See listings marked "*" under individual product headings.

STAMPINGS

Accurate Spring Mfg. Co., 3823 W. Lake St., Chicago, Ill.
Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
American Metal Products Company, 3959 Linsdale Ave., Detroit, Mich.
American Tube & Stamping Plant, (Stanley Wks.), Bridgeport, Conn.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Davis Brake Beam Co., Laurel Ave., & P. R. R., Johnstown, Pa.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Homestead Valve Mfg. Co., P. O. Box 22, Coraopolis, Pa.
Hubbard, M. D., Spring Co., 707 Central Ave., Pontiac, Mich.
McKinney Mfg. Co., War Contract Div. No. 2, 1400 Metropolitan Ave., Pittsburgh, Pa.
Pressed Steel Tank Co., 1461 S. 66th St., Milwaukee, Wis.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 S. Centre St., Corry, Pa.
Scaife Co., Ann St., Oakmont, Pa.
Spriesch Tool & Mfg. Co., 22 Howard St., Buffalo, N. Y.
Stanley Works, The, New Britain & Bridgeport, Conn.
Toledo Stamping & Mfg. Co., 90 Fearing Blvd., Toledo, O.
Veeder-Root, Inc., Hartford, Conn.
Whitehead Stamping Co., 1667 W. Lafayette Blvd., Detroit, Mich.

STAMPS (Steel)

Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.
Matthews, Jas. H., & Co., 3978 Forbes St., Pittsburgh, Pa.

STAPLES (Wire)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Dept. A. C., Peoria, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The Youngstown, O.

STARTERS (Electric Motor)

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2700 East 79th St., Cleveland, O.
General Electric Co., Sec. H. 750-159, Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City
Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.

STEEL (Alloy)

Alan Wood Steel Co., Conshohocken, Pa.
Allegheny Ludlum Steel Corp., Dept. S-3, Brackenridge, Pa.
American Rolling Mill Co., The, 1311 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Anchor Drawn Steel Co., Latrobe, Pa.
Andrews Steel Co., The, Newport, Ky.
Barium Stainless Steel Corp., Canton, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., 139 Bern St., Reading, Pa.
Colonial Steel Div., Grant Bldg., Pittsburgh, Pa.
Columbia Steel Co., San Francisco, Calif.
Copperweld Steel Co., Warren, O.
Disston, Henry, & Sons, Inc., 726 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., and Co., Inc., 17 Grand St., New York City.
Heppenstall Co., Box S-12, 4620 Hatfield St., Pittsburgh, Pa.
Jessop Steel Co., 584 Green St., Washington, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Newport Rolling Mill Co., The, Newport, Ky.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Simonds Saw & Steel Co., 1350 Columbia Rd., Boston, Mass.
Smith, David, Steel Co., Inc., 234—46th St., Brooklyn, N. Y.
Stanley Works, The, New Britain & Bridgeport, Conn.
Superior Steel Corp., Carnegie, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
United States Steel Supply Co., 1316 Wabansia Ave., Chicago, Ill.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Washburn Wire Co., Phillipsdale, R. I.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Alloy—Abrasive, Corrosion & Heat Resistant)

Acme Steel Co., 2826 Archer Ave., Chicago, Ill.
Allegheny Ludlum Steel Corp., Dept. S-5, Brackenridge, Pa.
American Brake Shoe Co., American Manganese Steel Div., 389 E. 14th St., Chicago, Ill.
American Rolling Mill Co., The, 1411 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Barium Stainless Steel Corp., Canton, O.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 945 E. 67th St., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., 139 Bern St., Reading, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., and Co., Inc., 17 Grand St., New York City.
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
International Nickel Co., Inc., 67 Wall St., New York City.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Michiana Products Corp., Michigan City, Ind.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Rustless Iron & Steel Corp., 3400 E. Chase St., Baltimore, Md.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain & Bridgeport, Conn.
Superior Steel Corp., Carnegie, Pa.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

STEEL (Alloy—Cold Finished)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Copperweld Steel Co., Warren, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Republic Steel Co., Dept. ST., Cleveland, O.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Clad—Corrosion Resisting) (*Also Stainless)

*Allegheny Ludlum Steel Corp., Dept. S-5, Brackenridge, Pa.
*Copperweld Steel Co., Warren, O.
*Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.
Superior Steel Corp., Carnegie, Pa.

STEEL (Cold Finished)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
General Steel Warehouse Co., Inc., 1830 N. Kostner Ave., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Purdy, A. R., Co., Inc., 792 Greenwich St., New York City.
Roebling's, John A., Sons Co., Trenton, N. J.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Smith, David, Steel Co., Inc., 234—46th St., Brooklyn, N. Y.
Timken Roller Bearing Co., The, Canton, O.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
United States Steel Supply Co., 1316 Wabansia Ave., Chicago, Ill.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Die)

Allegheny Ludlum Steel Corp., Dept. S-3, Brackenridge, Pa.
Anchor Drawn Steel Co., Latrobe, Pa.
Carpenter Steel Co., 139 Bern St., Reading, Pa.
Colonial Steel Div., Grant Bldg., Pittsburgh, Pa
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland, O.
Disston Henry, & Sons, Inc. 726 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL (High Speed or Carbon Tool)

Allegheny Ludlum Steel Corp., Dept. S-5, Brackenridge, Pa.
Anchor Drawn Steel Co., Latrobe, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 947 E. 67th St., Cleveland, O.
Carpenter Steel Co., 139 Bern St., Reading, Pa.
Colonial Steel Div., Grant Bldg., Pittsburgh, Pa.
Copperweld Steel Co., Warren, O.
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland, O.
Disston, Henry, & Sons, Inc., 726 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Jessop, Wm., & Sons Co., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Broach & Mach. Co., 5600 St. Jean, Detroit, Mich.
Purdy, A. R. Co., Inc., 792 Greenwich St., New York City.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T. & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Sandvik Steel, Inc., New York City.
Smith, David, Steel Co., Inc., 234—46th St., Brooklyn, N. Y.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Wesson Company, Ferndale Station, Detroit Mich.

STEEL (High Tensile, Low Alloy)

Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., The, 1411 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cold Metal Products Co., The, 2131 Wilson Ave., Youngstown, O.
Columbia Steel Co., San Francisco, Calif.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Timken Roller Bearing Co., The, Canton, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Nitrided)

Allegheny Ludlum Steel Corp., Dept. S-5, Brackenridge, Pa.

STEEL (Screw Stock)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
General Steel Warehouse Co., Inc., 1830 N. Kostner Ave., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Smith, David, Steel Co., Inc., 234—46th St., Brooklyn, N. Y.

STEEL (Screw Stock)—Cont.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Solder Coated)
Thomas Steel Co., The, Warren, O.

STEEL (Specialties)
Simonds Saw & Steel Co., 1350 Columbia Rd., Boston, Mass.

STEEL (Spring)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Barnes, Wallace Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Cold Metal Products Co., The, 2131 Wilson Ave., Youngstown, O.
General Steel Warehouse Co., Inc., 1830 N. Kostner Ave., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Purdy, A. R., Co., Inc., 792 Greenwich St., New York City.
Roebling's, John A., Sons Co., Trenton, N. J.
Sandvik Steel, Inc., New York City.
Smith, David, Steel Co., Inc., 234—46th St., Brooklyn, N. Y.
Thomas Steel Co., The, Warren, O.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Stainless)—See listings marked "*" under individual product headings.

STEEL (Strapping)
Acme Steel Co., 2826 Archer Ave., Chicago, Ill.
Atkins, E. C., & Co., 427 S. Illinois St., Indianapolis, Ind.

STEEL (Strip—Brass, Bronze Copper and Nickel Coated)
American Nickeloid Co., 1310 Second St., Peru, Ill.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Stanley Works, The, New Britain & Bridgeport, Conn.
Thomas Steel Co., The, Warren, O.

STEEL (Strip—Hot or Cold Rolled) (*Also Stainless)
Acme Steel Co., 2826 Archer Ave., Chicago, Ill.
Alan Wood Steel Co., Conshohocken, Pa.
*Alleghony Ludlum Steel Corp., Dept. S-5, Brackenridge, Pa.
*American Rolling Mill Co., The, 1311 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
American Tube & Stamping Plant, (Stanley Wks.), Bridgeport, Conn.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
*Carpenter Steel Co., 139 Bern St., Reading, Pa.
Cold Metal Products Co., The, 2131 Wilson Ave., Youngstown, O.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
General Steel Warehouse Co., Inc., 1830 N. Kostner Ave., Chicago, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Seneca Wire & Mfg. Co., Fostoria, O.
*Stanley Works, The, New Britain & Bridgeport, Conn.
Superior Steel Corp., Carnegie, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Thomas Steel Co., The, Warren, O.
*United States Steel Supply Co., 1316 Wabansia Ave., Chicago, Ill.
Washburn Wire Co., 118th St. & Harlem River, New York City.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Strip—Tin Coated)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Thomas Steel Co., The, Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City.

STEEL (Strip—Zinc Coated)
Acme Steel Co., 2826 Archer Ave., Chicago, Ill.
American Nickeloid Co., 1310 Second St., Peru, Ill.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Thomas Steel Co., The, Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City.

STEEL (Structural) (*Also Stainless)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Belmont Iron Works, 22nd St. and Washington Ave., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
*Carnegie-Illinois Steel Corp. Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
*United States Steel Supply Co., 1316 Wabansia Ave., Chicago, Ill.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Tool)
Allegheny Ludlum Steel Corp., Dept. Dept. S-5, Brackenridge, Pa.
Anchor Drawn Steel Co., Latrobe, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 945 E. 67th St., Cleveland, O.
Carpenter Steel Co., 139 Bern St., Reading, Pa.
Colonial Steel Div., Grant Bldg., Pittsburgh, Pa.
Copperweld Steel Co., Warren, O.
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland, O.
Disston, Henry, & Sons, Inc., 726 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Jessop, Wm., & Sons Co., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Broach & Mach. Co., 5600 St. Jean, Detroit, Mich.
Purdy, A. R., Co., Inc., 792 Greenwich St., New York City.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Sandvik Steel, Inc., New York City.
Smith, David, Steel Co., Inc., 234—46th St., Brooklyn, N. Y.
Tennessee Coal, Iron and Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Wesson Company, Ferndale Station, Detroit, Mich.

STEEL BUILDINGS—See BRIDGES, BUILDINGS, ETC.

STEEL DOORS & SHUTTERS—See DOORS & SHUTTERS

STEEL FABRICATORS—See BRIDGES, BUILDINGS, ETC.

STEEL FLOATING AND TERMINAL EQUIPMENT
Dravo Corp. (Engineering Works Div.), Neville Island, Pittsburgh, Pa.

STEEL PLATE CONSTRUCTION
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Belmont Iron Works, 22nd St., and Washington Ave., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Blaw-Knox Co., Blawnox, Pa.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
Graver Tank & Mfg. Co., Inc., 332 S. Michigan Ave., Chicago, Ill.
Hendrick Mfg. Co., Carbondale, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Levinson Steel Sales Co., The, 33 Pride St., Pittsburgh, Pa.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.
Struthers Wells Corp., Titusville, Pa.

STELLITE
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.

STENCILS (Spray and Sand Blast)
Matthews, Jas. H., & Co., 3978 Forbes St., Pittsburgh, Pa.

STEPS (Safety)
Hendrick Mfg. Co., Carbondale, Pa.

STOKERS
Babcock & Wilcox Co., The, 85 Liberty St., New York City
Westinghouse Electric & Mfg. Co., Steam Div., Lester, Pa.

STONES (Honing, Polishing, Sharpening)
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Norton Company, Worcester, Mass.

STOPPERS (Cinder Notch)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

STOPPERS (Rubber)
Rhoades, R. W., Metaline Co., 50-17 Fifth St., Long Island City, N. Y.

STORAGE EQUIPMENT
Graver Tank & Mfg. Co., Inc., 332 S. Michigan Ave., Chicago, Ill.

STORAGE BATTERIES—See BATTERIES (Storage)

STRAIGHTENING MACHINES—See BENDING & STRAIGHTENING MACHINES

SWAGING MACHINES
Etna Machine Co., The, 3400 Maplewood Ave., Toledo, O.
Ferracute Machine Co., Bridgeton, N. J.
Torrington Co., The, Torrington, Conn.

SWITCHES (Electric)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City
Mallory, P. R., & Co., 3029 E. Washington Ave., Indianapolis, Ind.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

TABLES (Elevating)
Lyon-Raymond Corp., 249 Madison St., Greene, N. Y.

TACHOMETERS
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.
Veeder-Root, Inc., Hartford, Conn.
Westinghouse Electric & Mfg. Co., Orange Ave., Newark, N. J.

TANKS (Gas Auxiliary)
Webb Corp., The, Webb City, Mo.

TANKS (Pickling)
National Carbon Co., W. 117th St. and Madison Ave., Cleveland, O.

TANKS (Storage, Pressure, Riveted, Welded)
Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Blaw-Knox Co., Blawnox, Pa.
Graver Tank & Mfg. Co., Inc., 332 S. Michigan Ave., Chicago, Ill.
Mahon, The R. C., Co., 8650 Mt. Elliott Ave., Detroit, Mich.
Pressed Steel Tank Co., 1461 S. 66th St., Milwaukee, Wis.
Scaife Co., Ann St., Oakmont, Pa.
Struthers Wells Corp., Titusville, Pa.

TANKS (Wood or Steel, Rubber or Lead Lined)
Heil Engineering Co., 12903 Elmwood Ave., Cleveland, O.
Mahon, The R. C., Co., 8650 Mt. Elliott Ave., Detroit, Mich.
National Lead Co., 111 Broadway, New York City

TAPES (Adhesive-Paper, Cloth, Fibre, Acetate, Film Backing)
General Electric Co., Sec. A 333-90, Appliance & Merchandising Dept., Bridgeport, Conn.
Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul, Minn.

TAPS AND DIES
Consolidated Machine Tool Corp., Winton & Blossom Rds., Rochester, N. Y.
Detroit Tap & Tool Co., 8432 Butler St., Detroit, Mich.
Greenfield Tap & Die Corp., Greenfield, Mass.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

TELEPHONES & TELEPHONE EQUIPMENT
Stromberg-Carlson Co., 100 Carlson Rd., Rochester, N. Y.

TERNE PLATE—See TIN OR TERNE PLATE

TESTERS (Valve)
Sturtevant, P. A., Co., Addison, Ill.

TESTING MACHINERY (Materials)

Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Magnaflux Corp., 5912 Northwest Highway, Chicago, Ill.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.

THERMIT WELDING EQUIPMENT AND MATERIALS

Metal & Thermit Corp., 120 Broadway, New York City.

THERMOCOUPLES

Richards, Arklay S., Co., Inc., 58 Winchester St., Newton Highlands, Mass.

THERMOMETERS

Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

THREAD CUTTING TOOLS

Detroit Tap & Tool Co., 8432 Butler St., Detroit, Mich.
Hill Acme Co., 6400 Breakwater Ave., Cleveland, O.
Landis Machine Co., Waynesboro, Pa.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

TIE PLATES

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TIN OR TERNE PLATE

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TIN PLATE MACHINERY

Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown, O.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Wean Engineering Co., Inc., The, Warren, O.

TITANIUM

Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

TONGS (Automatic)

Blaw-Knox Co., Blawnox, Pa.
Heppenstall Co., Box S-12, 4620 Hatfield St., Pittsburgh, Pa.

TONGS (Chain Pipe)

Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

TONGS (Rail Handling)

Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago, Ill.

TOOL BITS

Anchor Drawn Steel Co., Latrobe, Pa.
Colonial Steel Div., Grant Bldg., Pittsburgh, Pa.
Jessop Steel Co., 584 Green St., Washington, Pa.
Vanadium-Alloys Steel Co., Latrobe, Pa.

TOOL BITS (High Speed)

Allegheny Ludlum Steel Corp., Dept. S-5, Brackenridge, Pa.
Carpenter Steel Co., 139 Bern St., Reading, Pa.
Disston, Henry, & Sons, Inc., 726 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Simonds Saw & Steel Co., 1350 Columbia Rd., Boston, Mass.

TOOL HOLDERS

Apex Machine & Tool Co., 1025 S. Patterson Blvd., Dayton, O.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
South Bend Lathe Works, South Bend, Ind.
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

TOOLS (Diamond)

Diamond Tool Co., 933 E. 41st St., Chicago, Ill.

TOOLS (Non-Sparking, Safety)

Ampco Metal, Inc., Dept. S-7, 3830 W. Burnham St., Milwaukee, Wis.

TOOLS (Pneumatic)

Cleveland Pneumatic Tool Co., The, 3781 E. 77th St., Cleveland, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

TOOLS (Precision, Metal Cutting, etc.)

Brown & Sharpe Mfg. Co., Providence, R. I.
Carboloy Co., Inc., 11141 E. 8 Mile Rd., Detroit, Mich.
Eliott Mfg. Co., Milford, Conn.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Genesee Tool Co., Fenton, Mich.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill.
Luers, J. Milton, Mount Clemens, Mich.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
Micromatic Hone Corp., 1800 Schoolcraft Ave., Detroit, Mich.
South Bend Lathe Works, South Bend, Ind.
Wesson Company, Ferndale Station, Detroit, Mich.

TOOLS (Tipped, Carbide)

Carboloy Co., Inc., 11141 E. 8 Mile Rd., Detroit, Mich.
Eliott Mfg. Co., Milford, Conn.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Genesee Tool Co., Fenton, Mich.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
Wesson Company, Ferndale Station, Detroit, Mich.

TORCHES & BURNERS (Acetylene, Blow, Oxy-Acetylene)

Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.

TOWBOATS

Dravo Corp. (Engin'r'g Works Div.) Neville Island, Pittsburgh, Pa.

TOWERS (Transmission)

American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Blaw-Knox Co., Blawnox, Pa.

TOWERS (Tubular Hoisting)

Dravo Corp., (Machinery Div.) 300 Penn Ave., Pittsburgh, Pa.

TRACK ACCESSORIES

American Brake Shoe Co., Ramapo Ajax Div., 230 Park Ave., New York City.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Oliver Iron & Steel Corp., S. 10th & Muriel Sts., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

TRACK BOLTS—See BOLTS (Track)

TRAILERS

Chase Fdry. & Mfg. Co., 2300 S. Parsons Ave., Columbus, O.
Easton Car & Construction Co., Easton, Pa.
Mercury Manufacturing Co., 4140 S. Halsted St., Chicago, Ill.
Ohio Galvanizing & Mfg. Co., Penn St., Niles, O.

TRAMRAILS

American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.

TRANSFORMERS (Electric)

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
General Electric Co., Sec. H., 750-159, Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City
Westinghouse Electric & Mfg. Co., Sharon, Pa.

TRANSMISSIONS—VARIABLE SPEED

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.
Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.

TREADS (Safety)

Alan Wood Steel Co., Conshohocken, Pa.
Blaw-Knox Co., Blawnox, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul, Minn.
Norton Company, Worcester, Mass.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tri-Lok Co., 5515 Butler St., Pittsburgh, Pa.

TROLLEYS

American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Ford Chain Block Div., American Chain & Cable Co., Inc., 2nd & Diamond Sts., Philadelphia, Pa.
Reading Chain & Block Corp., 2102 Adams St., Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.

TRUCK CRANES

Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

TRUCKS AND TRACTORS (Electric Industrial)

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Easton Car & Construction Co., Easton, Pa.
Mercury Manufacturing Co., 4140 S. Halsted St., Chicago, Ill.

TRUCKS AND TRACTORS (Gasoline or Diesel—Industrial)

Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Buda Co., The, Harvey, Ill.
Clark Trucktractor Div., Clark Equipment Co., 127 Springfield Place, Battle Creek, Mich.
Mercury Manufacturing Co., 4140 S. Halsted St., Chicago, Ill.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.
Towmotor Co., 1223 E. 152nd St., Cleveland, O.

TRUCKS (Core)

Chicago Mfg. & Distr. Co., 1928 W. 46th St., Chicago, Ill.

TRUCKS (Dump-Industrial)

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Chase Fdry. & Mfg. Co., 2300 S. Parsons Ave., Columbus, O.
Easton Car & Construction Co., Easton, Pa.
Towmotor Co., 1223 E. 152nd St., Cleveland, O.

TRUCKS (Hydraulic Lift)

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Mercury Mfg. Co., 4140 S. Halsted St., Chicago, Ill.
Towmotor Co., 1223 E. 152nd St., Cleveland, O.

TRUCKS (Industrial)

Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Buda Co., The, Harvey, Ill.
Chase Fdry. & Mfg. Co., 2300 S. Parsons Ave., Columbus, O.
Easton Car & Construction Co., Easton, Pa.
Mercury Manufacturing Co., 4140 S. Halsted St., Chicago, Ill.
Ohio Galvanizing & Mfg. Co., Penn St., Niles, O.
Towmotor Co., 1223 E. 152nd St., Cleveland, O.

TRUCKS (Lift)

Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Clark Trucktractor Div., Clark Equipment Co., 127 Springfield Place, Battle Creek, Mich.
Easton Car & Construction Co., Easton, Pa.
Lyon-Raymond Corp., 249 Madison St., Greene, N. Y.
Mercury Manufacturing Co., 4140 S. Halsted St., Chicago, Ill.
Towmotor Co., 1223 E. 152nd St., Cleveland, O.

TUBE FITTINGS

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
Weatherhead Co., The, 300 East 131st St., Cleveland, O.

TUBE MILL EQUIPMENT

Aetna-Standard Engineering Co., The, Home Savings Bank Bldg., Youngstown, O.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Medart Co., The, 3520 DeKalb St., St. Louis, Mo.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Taylor-Wilson Mfg. Co., 1200 Thomson Ave., McKees Rocks, Pa.
Wean Engineering Co., Inc., The, Warren, O.
Yoder Co., The, 55 Walworth Ave., Cleveland, O.

TUBE WELDING MACHINES
Etna Machine Co., The, 3400 Maplewood Ave., Toledo, O.

TUBES (Boiler)
Allegheny Ludlum Steel Corp., Dept. S-3, Brackenridge, Pa.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 945 E. 67th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Michigan Seamless Tube Co., South Lyon, Mich.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Ryerson Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Standard Tube Co., The, 14600 Woodward Ave., Detroit, Mich.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Talon, Inc., Steel Tube Div., Oil City, Pa.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Tubular Service Corp., 32 Broadway, New York, N. Y.

TUBES (Brass, Bronze, Copper, Nickel, Nickel Silver)
American Brass Co., The, 25 Broadway, New York City.
Bridgeport Brass Co., Bridgeport, Conn.
International Nickel Co., Inc., The, 67 Wall St., New York City
Lewin-Mathes Co., Chouteau Ave. at Twelfth St., St. Louis, Mo.
Mueller Brass Co., Port Huron, Mich.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Shenango-Penn Mold Co., 411 W. Third St., Dover, O.

TUBES (Combustion)
Carborundum Co., The, Niagara Falls, N. Y.

TUBES (High Carbon)
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Standard Tube Co., The, 14600 Woodward Ave., Detroit, Mich.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Tubular Service Corp., 32 Broadway, New York, N. Y.

TUBES (Pneumatic Dispatch)
Lamson Corporation, ST-3, Lamson Ave., Syracuse, N. Y.

TUBING (Alloy Steel) (*Also Stainless)
*Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bissett Steel Co., The, 945 E. 67th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
*Flori Pipe Co., The, Red Bud & Bulwer Aves., St. Louis, Mo.
Michigan Seamless Tube Co., South Lyon, Mich.
*National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
*Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Timken Roller Bearing Co., Canton, Ohio.
Timken Steel & Tube Co., The, Canton, O.
Tubular Service Corp., 32 Broadway, New York, N. Y.

TUBING (Aluminum or Magnesium)
Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
Dow Chemical Co., The, Midland, Mich.

TUBING (Brass, Silicon-Bronze, Copper or Monel)
American Brass Co., The, 25 Broadway, New York City.
Bridgeport Brass Co., Bridgeport, Conn.
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.
Calumet and Hecla Consolidated Copper Co., Wolverine Tube Div., 1435 Central Ave., Detroit, Mich.
International Nickel Co., Inc., The, 67 Wall St., New York City.
Lewin-Mathes Co., Chouteau Ave. at Twelfth St., St. Louis, Mo.
Mueller Brass Co., Port Huron, Mich.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Shenango-Penn Mold Co., 411 W. Third St., Dover, O.

TUBING (Condenser)
Michigan Seamless Tube Co., South Lyon, Mich.

TUBING (Flexible Metal)
American Brass Co., The, 25 Broadway, New York City.
American Metal Hose Branch of The American Brass Co., Waterbury, Conn.
Chicago Metal Hose Corp., 1315 S. Third St., Maywood, Ill.
Pennsylvania Flexible Metallic Tubing Co., 7219 Powers Lane, Philadelphia, Pa.

TUBING (Mechanical)
Michigan Seamless Tube Co., South Lyon, Mich.

TUBING (Seamless, Aluminum)
Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.

TUBING (Seamless Flexible Metal)
American Metal Hose Branch of The American Brass Co., Waterbury, Conn.

TUBING (Seamless Steel)
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Columbia Steel Co., San Francisco, Calif.
Frasse, Peter A., and Co., Inc., 17 Grand St., New York City.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Michigan Seamless Tube Co., South Lyon, Mich.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Jersey City, N. J.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Tubular Service Corp., 32 Broadway, New York, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBING (Square, Rectangular and Shapes) (*Also Stainless)
Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
*Carpenter Steel Co., 139 Bern St., Reading, Pa.
Michigan Seamless Tube Co., South Lyon, Mich.
*National Tube Co., Frick Bldg., (PO Box 132), Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Standard Tube Co., The, 14600 Woodward Ave., Detroit, Mich.
*Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Tubular Service Corp., 32 Broadway, New York, N. Y.

TUBING (Tool Steel)
Sandvik Steel, Inc., New York City.

TUBING (Welded Steel) (*Also Stainless)
American Metal Products Co., 5959 Linsdale Ave., Detroit, Mich.
Babcock & Wilcox Co., The, Welded Tube Div., Alliance, O.
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.
*Carpenter Steel Co., 139 Bern St., Reading, Pa.
Flori Pipe Co., The, Red Bud & Bulwer Aves., St. Louis, Mo.
Frasse, Peter A., and Co., Inc., 17 Grand St., New York City.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Republic Steel Corp., Dept. ST, Cleveland, O.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Standard Tube Co., The, 14600 Woodward Ave., Detroit, Mich.
*Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Talon, Inc., Steel Tube Div., Oil City, Pa.
Tubular Service Corp., 32 Broadway, New York, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBULAR PRODUCTS
American Metal Products Company, 5959 Linsdale Ave., Detroit, Mich.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.
Michigan Seamless Tube Co., South Lyon, Mich.
Mueller Brass Co., Port Huron, Mich.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Standard Tube Co., The, 14600 Woodward Ave., Detroit, Mich.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Tubular Service Corp., 32 Broadway, New York, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUMBLING BARRELS (Coke Testing)
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

TUNGSTEN CARBIDE
Bissett Steel Co., The, 945 E. 67th St., Cleveland, O.
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

TUNGSTEN CARBIDE (Tools and Dies)
Carboloy Co., Inc., 11141 E. 8 Mile Rd., Detroit, Mich.
Eliott Mfg. Co., Milford, Conn.
Firth-Sterling Steel Co., McKeesport, Pa.
Genesee Tool Co., Fenton, Mich.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TUNGSTEN METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.

TURBINES (Steam)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

TURBO BLOWERS—See BLOWERS

TURNTABLES
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Chase Fdry. & Mfg. Co., 2300 S. Parsons Ave., Columbus, O.
Easton Car & Construction Co., Easton, Pa.

TURRET LATHES—See LATHES (Turret)

TURRET LATHE CUTTERS (Carbide Tipped)
Firth-Sterling Steel Co., McKeesport, Pa.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TWIST DRILLS
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland, O.
Greenfield Tap & Die Corp., Greenfield, Mass.

VACUUM CLEANERS
General Electric Co., Sec. A 333-90, Appliance & Merchandising Dept., Bridgeport, Conn.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

VALVE CONTROLS
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.
Philadelphia Gear Works, Erie Ave. & G St., Philadelphia, Pa.

VALVE CONTROLS (Motor Operated Units)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Ward Leonard Electric Co., 65 South St., Mt. Vernon, N. Y.

VALVES (Blast Furnace)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Blaw-Knox Co., Blawnox, Pa.
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.
Freyn Engineering Co., 310 S. Michigan Ave., Chicago, Ill.
R-S Products Corp., 132 Berkley St., Philadelphia, Pa.

VALVES (Blow-off)
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Homestead Valve Mfg. Co., P. O. Box 22, Coraopolis, Pa.

VALVES (Butterfly)
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
R-S Products Corp., 132 Berkley St., Philadelphia, Pa.

VALVES (Check)
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Reading, Pa.
Watson-Stillman Co. Roselle, N. J.
Weatherhead Co., The, 300 E. 131st St., Cleveland, O.

VALVES (Chemical)
Hills-McCanna Co., 2434 Nelson St., Chicago, Ill.

VALVES (Control—Air or Hydraulic)
Anker-Holth Mfg. Co.—Airgrip Chuck Div., 332 S. Michigan Ave., Chicago, Ill.
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Cleveland Pneumatic Tool Co., 3781 E. 77th St., Cleveland, O.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Denison Engineering Co., The, 1163 Dublin Rd., Columbus, O.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Galland-Henning Mfg. Co., 2747 S. 31st St., Milwaukee, Wis.
Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago, Ill.
Homestead Valve Mfg. Co., P. O. Box 22, Coraopolis, Pa.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
R-S Products Corp., 132 Berkley St., Philadelphia, Pa.
Racine Tool & Machine Co., Racine, Wis.
Vickers, Inc., 1480 Oakman Blvd., Detroit, Mich.
Weatherhead Co., The, 300 E. 131st St., Cleveland, O.

VALVES (Diaphragm)
Hills-McCanna Co., 2434 Nelson St., Chicago, Ill.

VALVES (Electrically Operated)

Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Galland-Henning Mfg. Co., 2747 S. 31st St., Milwaukee, Wis
R-S Products Corp., 152 Berkley St., Philadelphia, Pa.

VALVES (Gas & Air)

Hills-McCanna Co., 2434 Nelson St., Chicago, Ill.

VALVES (Gas and Air Reversing)

Blaw-Knox Co., Blawnox, Pa.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.

VALVES (Gate)

Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Crane Co., The, 836 S. Michigan Ave., Chicago, Ill.
Hammond Brass Works, 1844 Summer St., Hammond, Ind.
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Reading, Pa.

VALVES (Globe)

Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Hammond Brass Works, 1844 Summer St., Hammond, Ind.
Mueller Brass Co., Port Huron, Mich.
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Reading, Pa.
Watson-Stillman Co., Roselle, N. J.

VALVES (Hydraulic)

Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Bayard, M. L. & Co., 20th & Indiana Ave., Philadelphia, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Cross Gear & Machine Co., 3250 Bellevue Ave., Detroit, Mich.
Denison Engineering Co., The, 1165 Dublin Rd., Columbus, O.
Galland-Henning Mfg. Co., 2747 South 31st St., Milwaukee, Wis.
Homestead Valve Mfg. Co., P. O. Box 22, Coraopolis, Pa.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
R-S Products Corp., 152 Berkley St., Philadelphia, Pa.
Racine Tool & Machine Co., Racine, Wis.
Vickers, Inc., 1480 Oakman Blvd., Detroit, Mich.
Watson-Stillman Co., Roselle, N. J.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

VALVES (Needle)

Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Reading, Pa.
Watson-Stillman Co., Roselle, N. J.

VALVES (Plug)

Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Homestead Valve Mfg. Co., P. O. Box 22, Coraopolis, Pa.

VALVES (Steam, Water)

Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Hills-McCanna Co., 2434 Nelson St., Chicago, Ill.
R-S Products Corp., 152 Berkley St., Philadelphia, Pa.
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Reading, Pa.

VANADIUM

Electro Metallurgical Co., 30 E. 42nd St., New York City.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

VENTILATING EQUIPMENT (Engine)

Donaldson Co., 666 Pelham St., St. Paul, Minn.

VIADUCTS (Steel)—See BRIDGES, ETC.

VIBRATORS (Electric)

Syntron Co., Homer City, Pa.

VISES (Pneumatic)

Hannifin Mfg. Co., 621-631 S. Kolmar Ave., Chicago, Ill.

WALKWAYS—See FLOORING—(Steel)

WASHERS (Iron and Steel)

Beall Tool Co., East Alton, Ill.
Garrett, George K., Co., D & Tioga Sts., Philadelphia, Pa.
Hubbard, M. D., Spring Co., 707 Central Ave., Pontiac, Mich.
Oliver Iron & Steel Corp., S. 10th & Muriel Sts., Pittsburgh, Pa.
Whitehead Stamping Co., 1669 W. LaFayette Blvd., Detroit, Mich.

WASHERS (Lead)

National Lead Co., 111 Broadway, New York City

WASHERS (Lock)

Beall Tool Co., East Alton, Ill.
Garrett, George K., Co., D & Tioga Sts., Philadelphia, Pa.
National Lock Washer Co., Newark, N. J.

WASHERS (Nonferrous and Stainless)

Beall Tool Co., East Alton, Ill.
Garrett, George K., Co., D & Tioga Sts., Philadelphia, Pa.
Harper, H. M., Co., The, 2646 Fletcher St., Chicago, Ill.
Shenango-Penn Mold Co., 411 W. Third St., Dover, O.

WASHERS (Spring)

Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Beall Tool Co., East Alton, Ill.
Garrett, George K., Co., D & Tioga Sts., Philadelphia, Pa.
National Lock Washer Co., Newark, N. J.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 S. Centre St., Corry, Pa.

WATER COOLERS

Blaw-Knox Co., Blawnox, Pa.
General Electric Co., (Air Conditioning & Commercial Refrigeration Dept., Div. 437), Bloomfield, N. J.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Westinghouse Electric & Mfg. Co., 653 Page Blvd., Springfield, Mass.

WATER FILTRATION & SOFTENING EQUIPMENT

Adams, R. P., Co., Inc., 75 Chicago St., Buffalo, N. Y.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Carborundum Co., The, Niagara Falls, N. Y.
Graver Tank & Mfg. Co., Inc., 332 S. Michigan Ave., Chicago, Ill.
Syntron Co., Homer City, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

WELDED SHEET METAL ASSEMBLIES

Milwaukee Metal Spinning Co., 3502 W. Pierce St., Milwaukee, Wis.

WELDED STEEL CONSTRUCTION

Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Mahon, The R. C., Co., 8650 Mt. Elliott Ave., Detroit, Mich.

WELDERS (Electric—Arc)

Air Reduction, 60 E. 42nd St., New York City.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
General Electric Co., Sec. H., 750-159, Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Hobart Bros., Co., The, Box ST-633, Troy, O.
Lincoln Electric Co., The, Cleveland, O.
Progressive Welder Co., 3050 E. Outer Drive, Detroit, Mich.
Welding Equipment & Supply Co., 220 Leib St., Detroit, Mich.
Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.
Wilson Welder & Metals Co., 60 E. 42nd St., New York City

WELDERS (Electric-Resistance)

Federal Machine & Welder Co., Dana Ave., Warren, O.

WELDING

Air Reduction, 60 E. 42nd St., New York City.
Bartlett-Hayward Div. Koppers Co., Baltimore, Md.
Bayard, M. L., & Co., 20th & Indiana Ave., Philadelphia, Pa.
Eutectic Welding Alloys, Inc., 40 Worth St., New York City.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O.
Metal & Thermit Corp., 120 Broadway, New York City.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.
Scaife Co., Ann St., Oakmont, Pa.
Wilson Welder & Metals Co., 60 E. 42nd St., New York City

WELDING (Resistance)

Progressive Welder Co., 3050 E. Outer Drive, Detroit, Mich.

WELDING (Stainless)

Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Metal & Thermit Corp., 120 Broadway, New York City.

WELDING (Thermit)

Metal & Thermit Corp., 120 Broadway, New York City.

WELDING AND CUTTING APPARATUS AND SUPPLIES (Electric)

Air Reduction, 60 E. 42nd St., New York City.
Anaconda Wire & Cable Co., 95 Broadway, New York City.
Chicago Mfg. & Distr. Co., 1928 W. 46th St., Chicago, Ill.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
General Electric Co., Sec. H, 750-159, Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Hobart Bros. Co., The, Box ST-633, Troy, O.
Lincoln Electric Co., The, Cleveland, O.
McKay Co., The, York, Pa.
Mallory, P. R., & Co., 3029 E. Washington Ave., Indianapolis, Ind.
Oakite Products, Inc., 22 Thames St., New York City.
Welding Engineering Co., 264 E. Ogden Ave., Milwaukee, Wis.
Welding Equipment & Supply Co., 220 Leib St., Detroit, Mich.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.
Wilson Welder & Metals Co., 60 E. 42nd St., New York City.

WELDING AND CUTTING APPARATUS AND SUPPLIES (Oxy-Acetylene)

Air Reduction, 60 E. 42nd St., New York City.
Chicago Mfg. & Distr. Co., 1928 W. 46th St., Chicago, Ill.
Linde Air Products Co., The, 30 E. 42nd St., New York City.
Oakite Products, Inc., 22 Thames St., New York City.
Turco Products, Inc., 6135 S. Central Ave., Los Angeles, Cal.
Welding Equipment & Supply Co., 220 Leib St., Detroit, Mich.

WELDING DIES (Flash)

Mallory, P. R., & Co., 3029 E. Washington Ave., Indianapolis, Ind.

WELDING FIXTURES

Progressive Welder Co., 3050 E. Outer Drive, Detroit, Mich.

WELDING POSITIONERS

Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago, Ill.
Ransome Machinery Co., Dunellen, N. J.

WELDING RODS (Alloy) (*Also Stainless)

*Allegheny Ludlum Steel Corp., Dept. S-5, Brackenridge, Pa.
*Alloy Rods Co., York, Pa.
Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
American Agile Corp., 5806 Hough Ave., Cleveland, O.
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
*Carpenter Steel Co., 139 Bern St., Reading, Pa.
Champion Rivet Co., The, 11200 Harvard Ave., Cleveland, O.
*Eutectic Welding Alloys, Inc. 40 Worth Street, New York City
*Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
International Nickel Co. Inc., The, 67 Wall Street, New York City.
Metal & Thermit Corp., 120 Broadway, New York City.
*Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Reid-Avery Co., The, Cleveland & Chesapeake Sts., Baltimore, Md.
Welding Equipment & Supply Co., 220 Leib St., Detroit, Mich.
*Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.

WELDING RODS (Bronze)

American Brass Co., The, 25 Broadway, New York City.
Ampco Metal Inc., Dept. S-7, 3830 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.
Eutectic Welding Alloys, Inc., 40 Worth Street, New York City
Mueller Brass Co., Port Huron, Mich.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Welding Equipment & Supply Co., 220 Leib St., Detroit, Mich.

WELDING RODS (Hard Surfacing)

American Brake Shoe Co., American Manganese Steel Div., 389 E. 14th St., Chicago, Ill.
Eutectic Welding Alloys Inc., 40 Worth Street, New York City
*Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O.
Metal & Thermit Corp., 120 Broadway, New York City.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.

WELDING RODS (Magnesium)

Dow Chemical Co., The, Midland, Mich.

WELDING RODS OR WIRE

Air Reduction, 60 E. 42nd St., New York City.
Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
American Agile Corp., 5806 Hough Ave., Cleveland, O.
American Brass Co., The, 25 Broadway, New York City.
American Steel & Wire Co., Rockefeller Bldg, Cleveland, O.
Ampco Metal, Inc., Dept. S-7, 3830 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.
Champion Rivet Co., The, 11200 Harvard Ave., Cleveland, O.
Eutectic Welding Alloys, Inc., 40 Worth Street, New York City
General Electric Co., Sec. H., 750-159, Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.

WELDING RODS OR WIRE—Cont.

Hobart Bros. Co., The, Box ST-633, Troy, O.
Keystone Steel & Wire Co., Dept. A.C., Peoria, Ill.
Lincoln Electric Co., The, Cleveland, O.
Linde Air Products Co., The, 30 E. 42nd St., New York City.
McKay Co., The, York, Pa.
Metal & Thermit Corp., 120 Broadway, New York City.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Reid-Avery Co., The, Cleveland & Chesapeake Sts., Baltimore, Md.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Seneca Wire & Mfg. Co., Fostoria, O.
Welding Equipment & Supply Co., 220 Leib St., Detroit, Mich.
Westinghouse Electric & Mfg. Co., Dept. 7-N, E. Pittsburgh, Pa.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wilson Welder & Metals Co., 60 East 42nd St., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WELDING TIPS (Spot)

Mallory, P. R., & Co., 3029 E. Washington Ave., Indianapolis, Ind.

WELDING WHEELS (Seam)

Mallory, P. R., & Co., 3029 E. Washington Ave., Indianapolis, Ind.

WELL WATER SUPPLY SYSTEMS

Layne & Bowler, Inc., Memphis, Tenn.

WHEELS (Buffing and Polishing)

Chicago Wheel & Manufacturing Co., Dept. ST-7, 1101 W. Monroe St., Chicago, Ill.

WHEELS (Car, Locomotive or Truck)

American Brake Shoe Co., Southern Wheel Div., 230 Park Ave., New York City.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Chase Fdry. & Mfg. Co., 2300 S. Parsons Ave., Columbus, O.
Columbia Steel Co., San Francisco, Calif.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

WINCHES (Electric)

Graybar Electric Co., 420 Lexington Ave., New York City
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

WINCHES (Gasoline, Diesel)

Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

WIRE (Alloy Steel) (*Also Stainless)

*Allegheny Ludlum Steel Corp., Dept. S-5, Brackenridge, Pa.
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
*Carpenter Steel Co., 139 Bern St., Reading, Pa.
Columbia Steel Co., San Francisco, Calif.
*Firth-Sterling Steel Co., McKeesport, Pa.
*Page Steel & Wire Div. of American Chain & Cable Co. Inc., Monessen, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Rustless Iron & Steel Corp., 3400 E. Chase St., Baltimore, Md.
Seneca Wire & Mfg. Co., Fostoria, O.

WIRE (Aluminum)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.

WIRE (Brass, Bronze, Phosphor Bronze, Silicon Bronze, Copper or Nickel Silver)

American Brass Co., The, 25 Broadway, New York City.
Bridgeport Brass Co., Bridgeport, Conn.
Bristol Brass Corp., The, Bristol, Conn.
Revere Copper & Brass Co., Inc., 230 Park Ave., New York City
Seymour Manufacturing Co., The, Seymour, Conn.

WIRE (Annealed, Bright, Galvanized)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Worcester, Mass.
Keystone Steel & Wire Co., Dept. AC, Peoria, Ill.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., Fostoria, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WIRE (Barb)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Dept. A.C., Peoria, Ill.
Republic Steel Corp., Dept. ST., Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

WIRE (Cold Drawn)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Johnson Steel & Wire Co., Worcester, Mass.
Keystone Steel & Wire Co., Dept. A.C., Peoria, Ill.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Washburn Wire Co., 118th St. & Harlem River, New York City.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

WIRE (High Carbon)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Firth-Sterling Steel Co., McKeesport, Pa.
General Steel Warehouse Co., Inc., 1830 N. Kostner Ave., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Keystone Steel & Wire Co., Dept. A.C., Peoria, Ill.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., Fostoria, O.
Washburn Wire Co., 118th St. and Harlem River, New York City.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WIRE (Magnet)

Anaconda Wire & Cable Co., 95 Broadway, New York City.

WIRE (Music)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Johnson Steel & Wire Co., Worcester, Mass.
Roebling's, John A., Sons Co., Trenton, N. J.
Washburn Wire Co., 118th St. and Harlem River, New York City.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

WIRE (Round, Flat, Square, Special Shapes)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
General Steel Warehouse Co., Inc., 1830 N. Kostner Ave., Chicago, Ill.
Johnson Steel & Wire Co., Worcester, Mass.
Keystone Steel & Wire Co., Dept. A.C., Peoria, Ill.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., Fostoria, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Washburn Wire Co., 118th St. and Harlem River, New York City.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WIRE (Spring)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Bethlehem Steel Co., Bethlehem, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
General Steel Warehouse Co., Inc., 1830 N. Kostner Ave., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Keystone Steel & Wire Co., Dept. AC, Peoria, Ill.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Washburn Wire Co., 118th St. & Harlem River, New York City.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WIRE (Stapling)

Acme Steel Co., 3826 Archer Ave., Chicago, Ill.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Dept. AC, Peoria, Ill.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

WIRE (Welding)—See WELDING RODS OR WIRE

WIRE AND CABLE (Electric)

Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Anaconda Wire & Cable Co., 95 Broadway, New York City.
General Electric Co., Sec. A 333-90, Appliance & Merchandise Dept., Bridgeport, Conn.
Graybar Electric Co., 420 Lexington Ave., New York City.
Progressive Welder Co., 3050 E. Outer Drive, Detroit, Mich.
Roebling's, John A., Sons Co., Trenton, N. J.
Welding Engineering Co., 264 E. Ogden Ave., Milwaukee, Wis.

WIRE CLOTH

Cyclone Fence Div., American Steel & Wire Co., Waukegan, Ill.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., Fostoria, O.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

WIRE COILING TOOLS (Cemented Carbide)

Firth-Sterling Steel Co., McKeesport, Pa.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

WIRE COVERING MACHINES

Fidelity Machine Co., 3908-18 Frankford Ave., Philadelphia, Pa.

WIRE FORMS, SHAPES AND SPECIALTIES

Accurate Spring Mfg. Co., 3823 W. Lake St., Chicago, Ill.
American Chain Div. American Chain & Cable Co., Inc., York, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Barnes, Wallace Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Columbia Steel Co., San Francisco, Calif.
Firth-Sterling Steel Co., McKeesport, Pa.
Hubbard, M. D., Spring Co., 707 Central Ave., Pontiac, Mich.
Keystone Steel & Wire Co., Dept. A.C., Peoria, Ill.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 S. Centre St., Corry, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., Fostoria, O.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

WIRE FORMING MACHINERY

Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Wean Engineering Co., Inc., The, Warren, O.

WIRE MILL EQUIPMENT

Fidelity Machine Co., 3908-18 Frankford Ave., Philadelphia, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Lewis Machine Co., 3450 E. 76th St., Cleveland, O.
Morgan Construction Co., Worcester, Mass.
Shuster, F. B., Co., The, New Haven, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

WIRE NAILS—See NAILS

WIRE PRODUCTS (*Also Stainless)

*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Continental Steel Corp., Kokomo, Ind.
Hubbard, M. D., Spring Co., 707 Central Ave., Pontiac, Mich.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Keystone Steel & Wire Co., Dept. AC, Peoria, Ill.
Leschen, A., & Sons Rope Co., 5909 Kennerly Ave., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.

WIRE PRODUCTS
(*Also Stainless)—Cont.

Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., Fostoria, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

WIRE ROPE AND FITTINGS

American Cable Div. of American Chain & Cable Co., Inc., Wilkes-Barre, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Hazard Wire Rope Div. of American Chain & Cable Co., Inc., Wilkes-Barre, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Leschen, A., & Sons Rope Co., 5909 Kennerly Ave., St. Louis, Mo.
Macwhyte Co., 2912 14th Ave., Kenosha, Wis.
Roebling's, John A., Sons Co., Trenton, N. J.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

WIRE ROPE SLINGS

American Cable Div. American Chain & Cable Co., Inc., Wilkes-Barre, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Hazard Wire Rope Div., American Chain & Cable Co., Inc., Wilkes Barre, Pa.
Leschen, A., & Sons Rope Co., 5909 Kennerly Ave., St. Louis, Mo.
Macwhyte Co., 2912 14th Ave., Kenosha,, Wis.
Roebling's, John A., Sons Co., Trenton, N. J.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

WIRE SPOOLING MACHINES

Fidelity Machine Co., 3908-18 Frankford Ave., Philadelphia, Pa.

WIRE STRAIGHTENING AND CUTTING MACHINERY

Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Lewis Machine Co., 3450 E. 76th St., Cleveland, O.
Shuster, F. B., Co., The, New Haven, Conn.
Watson-Stillman Co., Roselle, N. J.

WIRE WINDING MACHINES

Fidelity Machine Co., 3908-18 Frankford Ave., Philadelphia, Pa.

WRENCHES (Drop Forged)

Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

WRENCHES (Measuring & Gaging)

Sturtevant, P. A., Co., Addison, Ill.

WRENCHES (Torque)

Sturtevant, P. A., Co., Addison, Ill.

X-RAY EQUIPMENT (Industrial)

Westinghouse Electric and Mfg. Co., Baltimore, Md.

ZINC

American Zinc, Lead & Smelting Co., Paul Brown Building, St. Louis, Mo.
New Jersey Zinc Co., 160 Front St., New York City.

ZINC ALLOYS

New Jersey Zinc Co., 160 Front St., New York City.

ZINC OXIDE

American Zinc, Lead & Smelting Co., Paul Brown Bldg., St. Louis, Mo.
Anaconda Sales Company, 25 Broadway, New York City.
St. Joseph Lead Co., 250 Park Ave., New York City.

ZINC (Rolled Sheets, Strips, Coils)

New Jersey Zinc Co., 160 Front St., New York City.

ZINC SLABS

American Zinc, Lead & Smelting Co., Paul Brown Bldg., St. Louis, Mo.
Anaconda Sales Company, 25 Broadway, New York City.
St. Joseph Lead Co., 250 Park Ave., New York City.

ZIRCONIUM METAL AND ALLOYS

Electro Metallurgical Co., 30 E. 42nd St., New York City.

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Straight through every minute of the 24 hours your Cleveland Worm Gear Speed Reducers stand competent guard—they deliver dependable power to keep equipment going, come what may.

That's what they're built to do of course—yet Clevelands' almost endless capacity to absorb punishment and keep driving ahead is one of the things that the oldest customers mention most often with greatest appreciation. To quote from just a few:—

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"Twenty-four hours a day beginning 1929—our Clevelands get no special attention"—*heavy metals.*

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"Day and night since 1923; Clevelands insure uniform operation"—*portland cement.*

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"Our equipment *must* run continuously—Clevelands have prevented shutdowns here for more than 10 years"—*glass industry.*

Designed and built for peace, Clevelands today are doing a big wartime job. Count on them to stand by you always—all day today, all night tonight.

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In Canada: PEACOCK BROTHERS LIMITED

CLEVELAND WORM GEAR
SPEED REDUCERS

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